# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

VOL. XXIX. November 18, 1933 No. 751


# Notes and Comments

## The Science of Food

THOSE who heard Dr. Lampitt's Jubilee Lecture to the Society of Chemical Industry must have left the lecture hall with mixed feelings. The Jubilee Lectures were instituted for the express purpose of raising the standard of the papers delivered before the Society. This worthy object was to be secured by inviting lecturers who were known to be men of outstanding eloquence. Dr. Lampitt took the opportunity of delivering a slashing attack upon the present complaisance in regard to our knowledge of food chemistry. His concluding sentence when acknowledging a well-deserved vote of thanks virtually sums up his thesis: "I am appalled," he said, "not by the magnitude of the problem, but by the poor quality of the work that has been done." In that sentence there is both a condemnation of the past and a promise for the future. Dr. Lampitt recognises the nature of the problems that yet await solution, just as he criticises the attempts that have been made to solve those problems.

We have already pointed out the importance of the work of the food chemist when discussing the canning industry, and that importance is very properly emphasised by Dr. Lampitt, not only in regard to that industry, but also in every branch of food preparation. The work of the food chemist is growing and is of vital interest to every individual in the country. The food chemist is paid to keep our food wholesome so that we may continue in good health. It is his task to keep our food in so high a condition, to keep its quality so irreproachable that nothing shall be lacking which is required for our sustenance. We believe that the health and, therefore, the future standard of achievement of the whole human race rests with the food chemist. It is a great responsibility and we are not a little disturbed to hear one of our senior food chemists indict so forcibly the present standard of achievement.

## A Multitude of Papers

To keep us well, or rather to get us well when we have fallen ill, the doctor has been known to administer certain potions to our internal organs; it matters not to him of what colour the potion may be; or that its taste is such that we are constrained, having once tasted, "to empty the dull opiate to the drain"; nor even if the smell so offend the nose that the stomach revolts in advance. The food chemist, on the other hand, must consider all these things. Not only must he make our food wholesome, he must ensure that it is palatable.

What are the chemical bodies that cause palatability? What is their structure and how is that structure modified during cooking or preservation? That is just one of the points which we do not recollect hearing Dr. Lampitt mention, and it illustrates the complexity of the problems. We have gone far beyond the days when the value of a food was assessed solely upon an effective calorific basis. Why is one fruit juice fresh and another not? We do not know. The acids in fruit juices, upon which flavour depends, are but little studied. We could go on inventing problems or we could quote Dr. Lampitt's instances, but we are forbidden to do so. Enough has been said to indicate some few of the problems awaiting solution. It is not that these subjects have not been investigated, for quoting Dr. Lampitt's dictum upon this subject, it is a case of—"So little the knowledge available—so multitudinous the papers published."

## Great Lack of Knowledge

IT would not be fair to follow Dr. Lampitt's erudite explanation of the reasons for the lack of knowledge, since he is to deliver the lecture twice more in different parts of the country. Those who hear the lecture, whether food chemists or not, are assured of something to think over. Dr. Lampitt very wisely stressed the value of accuracy in analysis, not only of the accurate performance of known analytical methods—that is mere craftsmanship—but of investigating established methods to discover how far they are even approximately capable of yielding results of the right order of magnitude. It is not only in the food industry that it is disturbing to think of the amount of work that has been built upon a flimsy basis. The importance of accurate analysis can be shown by the past history of the examination of drinking water for the Metropolitan Water Board.

Some seventy years ago Edward Frankland began systematically to examine the drinking water of London and soon discovered that existing methods were incomplete and unreliable. As a result of the new methods, carried out at a time when the reputation of Pasteur was not yet made and when the zymotic origin of infectious disease was scarcely suspected, it was found (according to a recent description by Pro-

fessor Armstrong, who assisted in the work) that "the conditions revealed were terrible. In few places could the water supply be certified free from sewage contamination." As the result of this work all our water supplies were overhauled. Other countries followed, and the water supply of all civilised countries is now safe. That is an example of what can be done by analysis. We do not yet know—our food supplies are in the same condition as were our water supplies. Perhaps we do not yet know because our work has been too superficial. We trust that if Dr. Lampitt's criticism is just, food chemists will see to it that the reproach is wiped from the slate; if it is not just, we think we can rely upon them to say so with no uncertain voice.

## Industrial Secrecy

WE have on various occasions deplored the attitude of secrecy with which many industrial concerns see fit to surround their achievements and we were pleased to hear that Dr. Lampitt takes the same view as we do ourselves. We hope that those who have listened to his lectures and those who will listen to his two further lectures will weigh his words carefully. It is clear that scientific work conducted with the purpose of devising a new or patented processes cannot be wholly divulged, at least until the patent has been obtained.

We hold, however, that there is much work of value which can be published that is to-day locked in the archives of industrial firms. One difficulty not mentioned by Dr. Lampitt is that work so hidden soon becomes lost and facts so discovered must be painfully rediscovered. It is our experience that in the course of a few years, even those who have performed the work very frequently forget all but the broadest details, whilst if those who have done the work leave the concern, the very remembrance that the work has been done fades into oblivion. We feel strongly that it is the duty of all industrial laboratories to keep a record of scientific discoveries—not just the preparation of new compounds of less than academic interest—that are likely to be of value, and should watch for an opportunity of publishing that as soon as circumstances will allow. Our own experience shows that there is rarely anything to gain by withholding all discoveries of scientific facts. We recollect, for example, when two quite important observations were made in regard to a certain branch of chemical technology. No little pains were taken to swear everyone to secrecy. Within two years, however, both of these discoveries were independently announced by members of a research staff of one of our Universities and not only was the information common knowledge, but those who had originally discovered the facts were denied all claim of priority.

## An Interchange of Ideas

IF a case can be made for publishing scientific results, an equally strong case can also be made for publishing improvements in industrial practice. We admit that there is competition between firms engaged in similar lines of business and that it may occasionally happen that a firm is able to make some improvement which reduces manufacturing costs so greatly or improves the quality of the goods to such a degree as to affect the competitive power of the concern profoundly. Such improvements are not very frequent and no doubt a firm is justified in maintaining secrecy as long as possible, although the interval of possible secrecy is not very long in these days. To-day competition as between firm and firm is less than international competition or even the competition between different industries. Interchange of ideas and achievements redounds to the good of all and it is more likely that every firm would benefit.

We are led to these remarks partly as the result of our frequent attendance at the meetings of various technical societies in many industries. In some—we will not mention names, but the chemical industry cannot hold itself blameless—there is marked reticence. In others—bearing in mind that we were recently in attendance at the annual meetings of the Institution of Gas Engineers and of the Coke Oven Managers' Association—we have been struck by the entire absence of reticence and by the general desire to publish all new ideas. We shall look forward to the time when the chemical industry will take the same attitude, for we believe that this is one of the principal steps which will lead to general prosperity from a national viewpoint.

## Abreast of the Times

KEEPING abreast of the latest developments in their own and allied industries should be a definite duty of every executive. The research chemist in the laboratory does his full share of reading. Were it not so, he would quickly fall behind the times and could easily waste his allotted funds in needless pursuit of data which is obtainable by direct reference to the available literature. Reading is part of the duty of the research chemist, but unless executives also read to the necessary extent of their share, they can never appreciate the true value of the work of those who are entrusted with the conduct of research activities.

Every month a vast amount of technical information is published. There are new theories, new methods, processes, materials and sources of supply. One cannot be expected to read all that is published, for there are axes to grind and logs to roll in the task of creating and keeping business. The trade journals which serve an industry can devote their whole time to this work; and when they have sifted the chaff from the wheat they have the essence of all that it is essential to know, served up in a form which will occupy a minimum amount of your time. When one personally has read those items which are directly of interest, it is well to remember that there is also information worth passing on to members of the staff. This article should be marked for sales manager or traveller; that article for the engineer or fitter. The employer who gives his employees ample opportunity to read and study the literature which directly concerns their particular jobs will be well rewarded. There is a two-fold effect to be gained, for employees will find it easier to comply with the management's requirements, and the management will or should find their staff always ready to tackle new work with a greater assurance of successful results.

# Paint as a Metal Preservative

## Paint Chemists and Corrosion Experts Discuss Important Questions

A JOINT meeting of the Oil and Colour Chemists' Association and the Chemical Engineering Group was held in the rooms of the Institute of Chemistry on November 9, for the purpose of discussing the functions of paint as a metal preservative. Mr. J. A. Frome Wilkinson (president of the Oil and Colour Chemists' Association) was in the chair, and was supported by Mr. W. A. S. Calder (chairman of the Chemical Engineering Group).

Dr. L. A. JORDAN (director, Research Association of British Paint, Colour and Varnish Manufacturers), who opened the discussion, said that it was at least satisfactory to know that paint is to-day receiving more attention as a factor in corrosion prevention than at any time since the war. This was because the authorities on corrosion seemed to have arrived simultaneously at the general conclusion that the only real justification for metal surfacing treatments upon which their previous hopes of corrosion prevention had been based was to provide a suitable base for paint. Concurrently, the metallurgist was playing his part in easing the load on the paint film.

Starting with the metal, said Dr. Jordan, the issues to consider could be reduced to (a) chemical inhibition of the corrosion process by pre-treatment; (b) chemical inhibition induced by special pigments in the priming coat; (c) maintenance and protection of the inhibited state; and (d) mechanical exclusion of corrosive influences. If an inhibited condition were obtained without a priming paint but by means of some chemical or other pre-treatment process on the metal, then the importance of the paint film was greater than ever. It was the appreciation of this fact by corrosion experts which could be regarded as the outstanding event of the last year or two. The metals in question generally came within the categories of cast iron, wrought iron, mild steel, aluminium, light alloys and galvanised material. Cast iron was not usually troublesome to the painter, doubtless owing to its tough skin, but the other metals were by no means easy to deal with, or even uniform on the same job. Scale and strain due to rolling, bending and pressing were important factors in this connection. De-scaling, wire brushing, scraping, sand-blasting, washing, pickling, etc., or any other method whereby all adherent matter was first removed from the metal to be painted were of supreme importance.

### Rustproofing Processes

The invisible natural oxide film which formed on some metals gave ideal protection, if it were continuous. Aluminium and the copper steels were cases in point, but the corrosion film in iron was rarely continuous; hence it was best removed. Magnetic oxide was one of the most resistant of such coatings, and its formation on the surface of the metal was the basis of the Bower-Barff process of rust prevention. The anodic oxidation process for aluminium followed the same idea, but had a wide field of use. In the Bower-Barff process a coating of magnetic oxide was produced on iron by heating at 900° C. in steam and air. This type of coating was very resistant to mechanical damage. Special oxidation treatments involving chromates, etc., and the "stimulated" coatings represented by " Parkerising " and " Bondering " of iron and steel were good examples of modern methods of surfacing in an attempt to prevent corrosion, apart from the paint coat. In the Bonderising process the best results were obtained by immersion in boiling solutions, and practically the process was limited to what could be treated in this way; application by spray or by other means was not yet a commercial matter, but it would doubtless come. These processes were making great strides in mass production work, for there was some evidence that the subsequent painting or lacquer finish was so much improved that the proportion of rejects was considerably reduced. It was important to note, however, that rupture of chemically prepared surfaces at once left the metal open to attack. For example, whilst Bonderising improved the corrosion resistance of films placed over it, of itself, it had no corrosion resistance value if the film were ruptured. Slightly scratched or damaged Bonderised metal exposed to the air rusted rapidly. Parkerising gave rather more satisfactory results than Bonderising in this respect, and, in turn, the corrosion resistance of the Parkerising could be increased by heat treatment at 750° F., at which temperature pyrophosphates were formed.

#### Conditions Beneath the Paint Film

Other methods of chemical inhibition were represented by natural " weathering," as in the case of zinc, or by plunging red-hot iron into linseed oil. From these it was but a step to the dipping of metals represented by tinning or galvanising. In all cases protection against rust obtained only so long as the outer coating was unbroken. What happened if the film were broken depended upon the electrical relationship of the metals. Zinc was electro-positive to iron, and if electro-chemical corrosion began it would be at the expense of the zinc. On the other hand, tin and lead were electro-negative, and corrosion would proceed at the expense of the iron; but, given continuity of the film, there was no reason why the electro-negative metals should not give as good, and in some cases better, protection than the electro-positive ones.

The really practical issue was " What goes wrong under a paint film when apparently everything possible has been done to secure the perfect job?" If electrolytes and water were excluded, if the metal were rendered passive, if sufficient inhibitors were present and if the paint film were continuous, non-permeable, etc., then presumably everything stayed in a satisfactory condition. Failure to achieve the absolute in any one of these conditions might lead to trouble, and of these factors doubtless traces of wet electrolyte were the worst. Comparatively few molecules of a chloride, for example, secreted in some capillary pore near the metal surface could, under suitable conditions, lift a substantial area of the paint.

#### Influence of Various Mediums

Coming to the inhibition of corrosion effected by special pigments, he urged that the importance of the medium must not be lost sight of, although the two were interdependent. In his view, the paint system must be regarded as a whole, in which the functions of the various constituents were not only intimately related but were interdependent. Red oxide of lead in linseed oil was still the most prominent priming material for metal, but oxide of iron was also largely used. These pigments were really artificial corrosion products and the important difference between paint films containing them and the natural corrosion product formed on the metal surface lay in the nature of the bond between the coating and the underlying metal. In the case of the natural oxide film, because of the lack of continuity and in spite of the chemical union between the oxide and the metal, effective protection was the exception and not the rule. The criterion of successful protection was the degree of lateral continuity, and in a paint this lateral continuity was given by the medium, which filled in the interstices between the pigment particles. Lead oxide, zinc oxide and basic pigments generally inhibited corrosion. Basic white lead, iron oxides and earth pigments had no marked effect; whilst graphite, barytes, Prussian blue, etc., stimulated corrosion, the latter class probably because of electrolytic effects. The metallic paints were usually good inhibitors, generally contrary to expectations, although it might well be that the pigment particles were sufficiently oxidised to render them electrically neutral.

### Spraying Hot Paint

Dispersion, oil absorption and soap formation in the pigment envelopes were of importance, and the medium itself was deserving of more attention than it usually received. The priming coat should provide the anti-corrosive activity, whilst the upper coats should protect the priming coat against mechanical damage, and particularly against moist and humid conditions. On the other hand, no oil system was really impermeable to water; water would pass most such films either by gaseous diffusion or by some osmotic effect.

For years there had been a strong school of thought that nitro-cellulose lacquer finished required oil primings, owing to the danger of failure of adhesion, but the Bonderising processes had brought about a better bond between the metal and the overlying coating. The treatment of the oil medium modified the manner of film formation, so that the final solid substance of the film possessed toughness and elasticity sufficient to accomodate the stresses engendered by mechanical and thermal movements of the support. Driers affected the water resistance of the film, and increase of the proportion of thinners generally diminished the corrosion resistance, though red lead might be regarded as an exception because it was so good anyway. Appreciation of this fact might some day lead to the development of ideas which even now were knocking at the door. He had in mind the German process of blowing and spraying hot paint (without thinner) on to heated metal through a gas blowpipe flame.

### Effect of Immersion in Water

Mr. L. WHITBY (Chemical Research Laboratory, Teddington) said that a successful paint was often defined as one that would retain useful mechanical properties over a number of years, and would exclude air and water from the material to which it was applied; but he was doubtful whether such a paint existed. His experience with regard to magnesium base alloys showed, so far as he had tested the matter, that no paint, however successful on other materials, was impervious when immersed in sea-water or a chloride solution. Allowing that no paint was perfectly impervious, we must allow that chemical inhibition of corrosion played a part in the mechanism of successful protection by paint. The success of red lead as a pigment for application to ferrous materials was no doubt due to its mild pacifying effect; chromates under certain conditions of exposure probably acted in the same manner. Zinc dust, as a pigment, however, owed its success to inhibition by sacrifice, *i.e.*, it was anodic to the iron. In the case of such sacrificial pigments the nature of the basis metal was important, and application of a zinc or aluminium pigmented undercoat to magnesium alloys exposed to wet conditions would have unfortunate effects, since the pigment would be cathodic to the magnesium and hence accelerate attack. The most useful pigments for such alloys would be those which tended to pacify the metal, such as the chromates.

Dr. H. HOULSTON MORGAN said the statement by Mr. Whitby that no paint film was impermeable when immersed in water continuously did not mean that paint films were entirely bad. Fortunately, most paint work had not to withstand continuous immersion, and if a soft wet film of paint on a piece of metal or glass were taken out of water and allowed to dry it would recover itself. A paint film on a piece of glass could be repeatedly immersed in water and taken out and allowed to dry, and would remain perfectly sound. But a paint film on iron would not recover itself again after a few alternate immersions and dryings; the adhesion would be weakened by interaction between the metal and the film ingredients, the reaction having been hastened by moisture and by light and heat. The function of rust inhibitors was in his opinion to increase the impermeability of the film to moisture. They were all of a basic nature and reacted with acid substances present. What we wanted was not a rust inhibitor, but a mildly basic material to neutralise the acids, but not sufficiently basic to embrittle the films, for brittle films would fail by cracking or by the weakening of adhesion due to the film not conforming to the changes in volume of the metal as it was heated and cooled.

### Non-Setting Red Leads

Mr. J. A. DOWNIE, in a written communication, mentioned a number of instances where the use of de-rusting agents had been followed by corrosion even more severe than the normal. Ordinary care in washing away the last traces of the de-rusting agents did not appear to be sufficient. Unless they could be removed, the wisdom of this pre-treatment appeared to be questionable. The high reputation enjoyed by red lead paint was, indisputably, won by the old-fashioned or reactive type of pigment, but all its honours and credit had been unostentatiously assumed by the newer type, *i.e.*, that known as the disperse, non-reactive or non-setting red lead. He (Mr. Downie) asked whether this latter was fully entitled to enjoy the same status as the reactive type or whether a definite distinction should be made between the two, such as, for example, that made between basic sulphate white lead and basic carbonate white lead. The two types behaved very differently as paints, even when freshly made. For example, certain non-setting red leads could not be made into satisfactorily usable paints without the incorporation of other pigments to prevent running and sagging.

### Use of Inhibitive Pigments

Mr. U. R. EVANS (Cambridge University), in a written contribution, quoted experiments which indicated the importance of using an inhibitive pigment such as red lead in the lowest coat of paint, in order to prevent the development of corrosion in case the uppermost coats were not quite so impermeable as we should like to imagine them to be. He did not deny the practical value of non-inhibitive pigment in the outer coats, nor did he suggest that all the substances which had shown themselves in the laboratory to be inhibitors would be suitable components of paints; but he did urge that the functions of the two classes of paints—inhibitors and mechanical excluders—should be clearly distinguished. The difference between the two classes was brought out by a series of outdoor tests made recently by S. C. Britton and himself. In studying the effect of varying the composition of the paints they found that with iron oxide paints containing different quantities of thinner the protection fell off steadily as the thinner-content was increased. But the analogous series of red lead paints gave quite different results. There the addition of thinner did not interfere with the protective power of the plant until suddenly, when too much thinner had been added, the pigment ceased to cover the metal, clear channels of oil appeared in the dried coat, and rust developed in these channels.

Dr. J. C. HUDSON (Corrosion Committee, Iron and Steel Institute and National Federation of Iron and Steel Manufacturers) indicated the nature of some tests now in progress, as described in detail in the first report of the Corrosion Committee to the Iron and Steel Industrial Research Council, published by the Iron and Steel Institute.

### Water in Paint Films

Dr. G. F. NEW (Research Association of British Paint, Colour and Varnish Manufacturers) exhibited photomicrographs showing the drops of water which had penetrated under a coat of quite good varnish on a glass slide which was immersed for two hours in water 24 hours after the varnish was applied. The top surface of the varnish showed swellings and cracks, which cracks persisted for months afterwards, so that obviously the power of the varnish to resist water and other destructive influences was greatly decreased. His object in showing these photographs was to emphasise that the medium should be considered far more than it had been in the past. It seemed that there were molecules of water behind and in every paint film, but the point that mattered was how many of the molecules were in contact with the metal, and attention was being given to this question of medium at the paint research station.

Mr. G. BOLTON SMITH, proceeding on the basis that, in spite of almost all precautions, there was bound to be a certain amount of water beneath all paint films, mentioned some experiments to arrive at a medium which would form a definite emulsion of the water on the surface of the metal so that there would be a tendency for the water to evaporate. The emulsion-forming vehicle was red lead with varnish fumes, so that one produced what might be called a "lead fumate."

The CHAIRMAN (Mr. J. A. Frome Wilkinson) referring to the application of paint by the German blowpipe method, pointed out that on a thick metallic surface there must be a lot of condensation of moisture which would disappear when the surface was heated, but he wondered how far that method could be applied to a surface with considerable heat capacity.

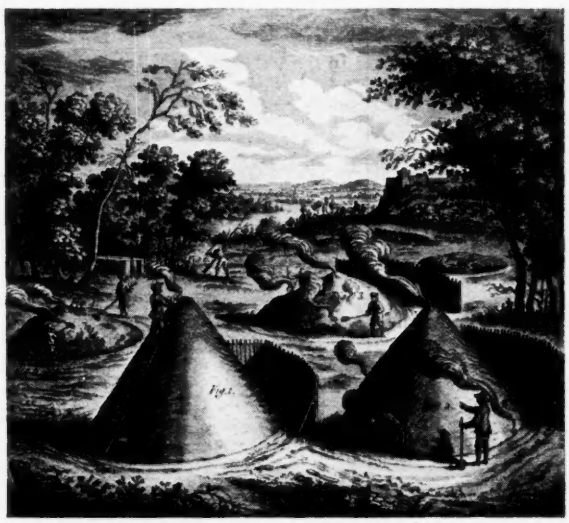
Dr. JORDAN, replying, said that in the blowpipe process there was no trouble due to condensation; the paint was not burned, and it did not fry. The finish was industrial and not decorative, but was a good finish. He had applied it to old galvanised iron, and to buckets containing water; all these possessing large heat capacity, but the heating was so rapid, if the flame were big enough, that condensation trouble was overcome.

# Charcoal Burning

## Will there be a Revival of the Industry?

OVER 4,000 tons of wood charcoal per year are imported into the United Kingdom. If this tonnage of charcoal were produced by burning in our own country, more than 20,000 tons of cordwood would be utilised, with consequent advantage to the owners of oak, beech, ash and birch trees, who, at the present time, have no sale for their toppings and small woods. If this tonnage of cordwood were carbonised in retorts by means of coal, at least 2,000 tons of that fuel would be required. In view of these figures, it may be advantageous to review the charcoal burning industry in Great Britain.

The demand for charcoal came from the need of a fuel suitable for smelting ores, and there is but little doubt that the greatest use for charcoal in the very early days of history came from the metallurgical industry. Charcoal was a common article in everyday life as domestic fuel, in the early centuries—as also to-day in France, India, China and numerous parts of the world. The earliest method of charcoal making (by the Macedonians) was in open pits, but this was replaced at a later stage by the more efficient heap (or Meiler) system. Old engravings of 1766 (Fig. 1 and 2) shows pictorially the method employed. The wood was collected into heaps and covered with earth and sods, except for vent holes round the bottom. The contents were then ignited, and



Methods of Charcoal Burning in the Woods in 1765.

when the heap of wood was aglow, the vent holes were closed except on the wind side. The rapidity of carbonisation was thus controlled, so as to last five to ten days, according to the size of the heap. The mass was then allowed to cool and finally extinguished with water. Charcoal produced in this way was dirty (full of stones, earth and unburnt pieces) and also wet. In addition, all the products from the wood were lost in the air.

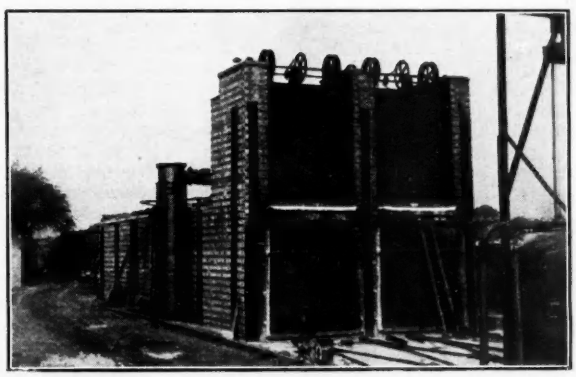
The next stage in the evolution of charcoal burning was the brick and the metal retort into which about 10 cwt. of the wood was placed. The retort was heated with wood or coal by means of brickwork flues; clean, dry charcoal was thus obtained. Also, as outlet pipes were fixed to the retorts, the vapour from the wood could be recovered by means of condensers. Boyle, in his "Sceptical Chemist" (1661) described the separation of a spirituous liquor from the volatile products obtained by the destructive distillation of wood. This was undoubtedly the wood spirit as we know it to-day.

In 1796, a factory was erected near Rotherham in Yorkshire, to supply retort-made charcoal to the Sheffield metallurgical industries. As it had also been discovered that some of the salts of acetic acid were valuable mordants in the Lancashire cotton trade, a further impetus was given to the investigation of wood distillation products. Until the beginning of the 20th century, the main products obtained by destructive distillation were charcoal, acetate of lime, wood naphtha and wood tar. Economic conditions, however, soon brought about improvement in technique. Fig. 3 shows a large 10 ton retort at a modern wood distillation factory. It replaces the older system of circular metal retorts holding 10 cwt.

The modern method consists of a 24-hour cycle of operation. The wood is charged into carriages (Fig. 4) which

Charcoal Making 168 years ago.

are mechanically hauled into the retorts. The retorts are of steel, set in brickwork, heated either by coal fire or producer gas. The operation of charging and discharging the retorts occupies but a few moments, so that but little temperature loss takes place. The temperatures are recorded by electrical pyrometers. At the end of the 24 hours, the carriages are withdrawn into steel cylinders, where, with the exclusion of air, the charcoal cools. The distillate from the retorts is also refined within the same period, with the production of grey acetate of lime, methyl acetone, miscible wood naphtha (to British Customs and Excise specification for methylating)



A Modern Ten-Ton Retort. The Brickwork surrounds two Retorts of that Capacity.

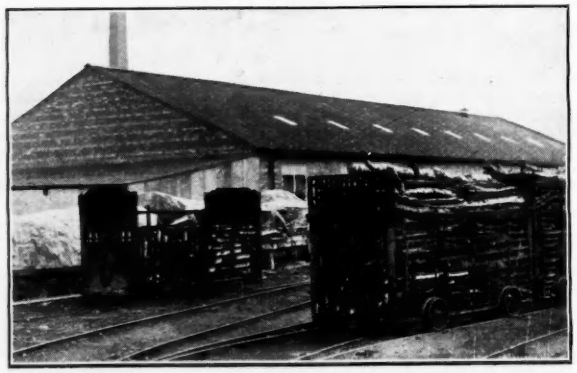
wood creosote, wood tar and pitch. These articles form the raw materials for the production of other chemicals required by industry, such as acetic acid, acetone, formaldehyde and medicinal creosote, and they were the only source of supply.

When we consider that the carbonisation of one ton of wood only produces approximately 100 lb. of 80 per cent. acetic acid, 3 gallons of acetone and 2½ gallons of wood naphtha, we can understand that as soon as industry required larger supplies of these commodities for cellulose and rayon

manufacture, etc., some method of production other than wood distillation was essential.

Progress, however, has also been made in the technique of wood distillation. Retorts holding 10 tons per charge are now in common practice with continuous rectification stills and the working up of the hitherto waste products (such as oils and tars) into saleable products. So far, no satisfactory material has been produced as a substitute for charcoal. Among the present day commercial uses for this article are case-hardening; chemicals ($CS_2$ manufacture and cyanides); pig, cattle and poultry foods; medicinal; insulation; filtration; horticulture (bulb-growing and greenkeeping); and as a fuel for internal combustion engine. The latter item is of considerable potential importance at the present time. By means of a small gas plant fixed on to the running board of a lorry, it is possible to propel a 30-cwt. load for 100 miles at a total fuel consumption of 72 lb. of charcoal. There are, of course, certain inconveniences attached to the use of charcoal as a fuel, but they are not serious.

The fluctuations in the industry of charcoal burning provide interesting contrasts. In the beginning the prime product was charcoal. The next was the recovery of the condensible gases in addition. To-day, it would seem that a return to the original mode of manufacture may be a natural sequence, with the erection of portable retorts in the woods and saw yards to provide fuel for internal combustion engines. Without such an outlet for charcoal, it would certainly seem that no expansion of the industry can take place; but whether it can maintain even its present status is extremely problematical.



Wood Carriages which are mechanically hauled into the Retorts.

# Dermatitis From Dyed Trimming

## Dye Manufacturers Involved in Claim for Compensation

IN the King's Bench Division on Wednesday, Mr. Justice Goddard concluded the hearing of an action by Mrs. Barbara Wills, of the Old Cottage, Esher, against Bentalls, Ltd., of Kingston-on-Thames, to recover damages for alleged breach of warranty on the sale of fur trimming from which she said that she contracted dermititis.

The defendants admitted that about the beginning of November, 1932, the plaintiff purchased from them a length of trimming. It was dyed wool trimming with no fur in its composition. They said they had no knowledge of the purpose for which the trimming was to be used and they denied that there was anything deleterious in the trimming. They delivered a statement of claim against the third party, Debenhams, Ltd., the wholesalers from whom they purchased the trimming in bulk, claiming to be indemnified in case they should be held liable to the plaintiff. Debenhams, Ltd., similarly claimed an indemnity from Astrachan, Ltd., the manufacturers of the trimming, Astrachan, Ltd., from Smithson-Gledhill, Ltd., the dyers of the material, and Smithson-Gledhill, Ltd., from Imperial Chemical Industries, Ltd., the manufacturers of the dye.

Plaintiff's case was that she was in perfect health when she purchased the trimming, which she made up into a loose collar for a coat. On the first day she wore the coat and collar for some hours on end and on the following day she had a sore on the left side of her neck. The trouble spread rapidly covering her neck from ear to ear, spreading to her face.

Dr. W. J. O'Donovan, of Harley Street, who attended the plaintiff, said he had tested her for idiosyncrasy with a piece of the collar with negative results.

Cross-examined, Dr. O'Donovan said he had no hesitation in diagnosing dye dermatitis. The witness was shown a number of analyses which had been made of portions of the collar, with negative results so far as noxious substances were concerned, and he said he was prepared to accept them so far as the portions analysed were concerned, but he thought that the local irritant to which the plaintiff's skin had been exposed might be due to excess of dye at one point and insufficient clearance at that point. That was the inference from the fact that the trouble started with a small patch and not with a general outbreak.

Mr. Whitehead, K.C., for the I.C.I., cross-examined. Witness said he was not competent to give evidence as to dyestuffs, but speaking without precision he had found that dyes with an aniline base were apt to be poisonous internally and deleterious externally.

Dr. Charles James John Fox, analytical chemist, also gave evidence as to dyeing processes.

For the defence, Dr. Thomas Edmund Alexander Stowell, the chief medical officer of Imperial Chemical Industries, Ltd., was called, and said that he was responsible for the medical supervision of all the company's works. He had seen many thousands of cases of dermatitis and knew the signs of dye dermatitis. He heard Dr. O'Donovan describe the patch test which he had applied to the plaintiff. The witness did not consider the test adequate; the results were not to be compared with the result of wearing a stole round her neck, which would introduce heat and friction.

Mr. Moresby, for the plaintiff: Is there any absolute test for idiosyncrasy?—There is nothing absolute in medicine at all. There might be an acquired idiosyncrasy which was not congenital.

He would not have cared to arrive at the diagnosis of dye dermatitis without more evidence than Dr. O'Donovan had; he would certainly want to know the class of dye used. He could not diagnose dye dermatitis by inspection.

In cross-examination, Dr. Stowell said that he did not regard himself as a dermatologist of the eminence of Dr. O'Donovan. He did not see the plaintiff till May, 1933, by which time there were no symptoms of any kind. From what Dr. O'Donovan told him he agreed with the diagnosis of dermatitis, but not of dye dermatitis.

Mr. Adolf Jaffé, analytical chemist, gave evidence of the analysis of part of the collar in which he found no toxic substance.

His lordship in giving judgment, said he thought that the scarf did cause the illness. It was just an unlucky accident, and did not mean that any of the parties was normally or even commercially to blame for supplying it. As to damages, the actual pecuniary loss was, fortunately, small, the special damage being £22 11s. But the plaintiff had suffered a very painful and irritating complaint for which he awarded her £150, in addition to the special damage.

It was admitted that the chain of indemnity went as far as the fourth party, but his lordship ordered that no judgment should be drawn up until he had heard arguments as to costs on Tuesday next. The issue between the fifth and six parties, whether the fault was in the dye, or in the process of dyeing, remained to be tried, but, his lordship hoped, not by himself.

# Chemical Matters in Parliament

## Dyestuffs (Import Regulation) Act

IN the House of Commons on November 8, Mr. Charles Brown (Mansfield) moved the omission of the Dyestuffs (Import Regulation) Act from the schedule of the Expiring Laws Continuance Bill. He said that when the measure was passed it was contended that the industry was vital to the future of the country, not merely for industrial and commercial, but for defence reasons also. It was held to be the duty of the State to give some assistance to an infant industry so that it might be established in this country. In 1913 we only produced 9,000,000 lb. weight of dyestuffs, but in 1923 our production had gone up to 20,000,000 lb. weight, and in 1929, which was the peak year, it was 55,000,000 lb. weight. Since then there had been some decline and in 1932 our production was 49,000,000 lb. weight. The industry was, therefore, no longer an infant industry, but was rather a colossus with one foot in Britain and another on the Continent. It was part of an international combine, and it was difficult to understand why this international combine should stand in need of special protection from the British Government.

An inquiry into the operations of the cartel had been recommended, and the Tariff Advisory Committee had intimated that they were willing to take up this task. He (Mr. Brown) asked whether the Government intended to act on that suggestion.

Mr. G. H. Eady (Bradford, Central), supporting the continuance of the Act, contested Mr. Brown's view that this favoured a system attacking the wages of the workpeople. Dyestuffs had nothing to do with the lowering of wages in the textile trade, or with Japanese competition. He hoped the Act would be continued, as it had been of great benefit to the textile trade.

Dr. Burgin (Parliamentary Secretary, Board of Trade), said the Government had decided to adopt the recommendations of the Import Duties Advisory Committee as to the dye industry, and a Bill to give effect to them would be introduced in the new session. As there was doubt, however, whether it would be possible to find time for the Bill to go through all its stages before Christmas it was necessary, as a precautionary measure, to continue the present legislation for a year. The Advisory Committee had been informed of the proposals of the Government, and it was understood that the Committee intended, in the near future, to make appropriate recommendations regarding changes in import duties referred to in their report. Immediately these changes were put into force the Board of Trade would issue, under the existing Act, an open general licence permitting the importation of the goods which the Committee had recommended should be no longer subject to duties. The Bill would include provision for the protection of the consumer as recommended by the Committee, and a joint standing committee of makers and users would be set up, not by the Bill but by the Board of Trade.

The amendment was rejected by 228 to 56.

# Road Making Materials

## Doubtful Value of Laboratory Work

THE testing of road-making materials was discussed by several speakers at the Public Works, Roads and Transport Congress, held in London this week.

Mr. R. G. C. Batson said the construction of roads was now passing from the stage when construction was based on the results of early experience to a stage where a technique had been developed whereby the value and type of stresses in all parts of the structure could be calculated. In general, however, the fundamental factors involved in the materials and processes used in the industry were unknown. The difficulties of correlating laboratory tests with road behaviour were great. The results from small-scale laboratory tests could be obtained in hours, but the behaviour of a road could only be estimated after years of usage.

Dealing with the qualities of tars for use on roads, Mr. W. E. Cone (technical adviser, British Road Tar Association), said the physical examination of tars has as its object the correlation of physical properties with the mechanical behaviour of mixtures of tars and aggregates when used in road construction. Attention is also being given to standard methods of testing. On the more practical side, a number of experiments have been carried out in collaboration with the Ministry of Transport and highway authorities, which include the surface treatment of various types of roads with tar, and the laying of improved forms of tarmacadam. The objects aimed at in these experiments are to obtain fuller information regarding the influence which the best constructional methods exert on the results to be obtained by tar, and to study the effects of such methods and the results obtained in practical road work. A prolonged investigation into the traffic bearing capacity of tarmacadam roads has shown the increased resistance of properly balanced mixtures of tar and aggregates to deformation under such stresses as are imposed upon the pavement of heavy traffic conditions. This has led to the development of tar concrete or hot-process tarmacadam, which differs principally from tarmacadam in the character of the aggregate and binder, and also in respect to the laying of the material, which is carried out in the heated state.

The mechanical testing of bituminous road mixtures was dealt with by Mr. Prevost Hubbard (chemical engineer, The Asphalt Institute, New York). He pointed out that there is considerable need for the development of a test which will measure the resistance to cracking of compressed bituminous paving mixtures, particularly those coming under the classification of hot-mixes. Impact and compression tests at low temperatures have been studied to some extent but have so far not produced much information of practical value. Cracking of a pavement may be produced by a number of causes, one of which is inadequate base support when the mixture is cold and, therefore, more nearly resembles a monolith than at any other time. It may also be produced by the drag of the base or underlying support which by shrinkage develops cracks that are reproduced in the overlying mixture or shrinkage at low temperature of the mixture itself may be responsible. It would seem that the most informative type of test to which the bituminous mixture could be subjected would be one in which a specimen of the mixture, rigidly held at both ends, would be rapidly chilled to a given temperature and its behaviour noted.

A further paper on the mechanical testing of asphalt was given by Mr. D. M. Wilson, B.Sc., A.I.C. All asphaltic materials possess a measure of plasticity and the rate of application of the load during a test has a very considerable effect. In the mechanical testing of asphalt a press of the hydraulic type, in which the load can be applied at a regular rate of increase by means of an hydraulic accumulator, is preferable. For small loads some type of lever machine is useful, in which a regularly increasing load can be applied by running lead shot into a container suspended from one end of the beam. This latter method of applying the load is especially useful when it is desired to compare the properties of different types of material over a wide range of temperature; the results can then be expressed on one scale.

# Trade Revival and the British Industries Fair

## Business Leaders' Confidence

STRIKING testimony to the reality of trade revival is given in statements issued this week from leaders of industries participating in the 1934 British Industries Fair. Although the Fair does not open until February 19, the Department of Overseas Trade and the Birmingham Chamber of Commerce report that the demand for exhibition space has broken all records. As evidence of overseas interest in the Fair twenty-two European countries—a record number—are granting travelling concessions to encourage their trade buyers to attend.

Lord MELCHETT says there can be no doubt that British industry has made real and substantial progress during the whole course of 1933. Industrial indices show an upward movement, a fact which has an added significance in view of the constant decline which has been a feature of the past two years. The chemical industry, he says, is largely dependent on the activities of other industries in this country, and the steady progress which it has made since the beginning of the year is a further indication of the all round improvement which is generally acknowledged. There is every reason to hope that this improvement will be cumulative and increase rather than diminish in the future. In the disturbed conditions which exist throughout the world to-day Britain is freer from competition than at any time in the last decade, and in a better position to take advantage of an unparalleled opportunity for expansion and development both at home and abroad.

### A Real and Definite Advance

Sir GEORGE MACDONOUGH, president of the Federation of British Industries, considers it more than probable that the British Industries Fair of 1934 will open under more propitious circumstances than have been experienced for the last two years. There has been a real and definite advance in this country towards economic recovery during the first nine months of 1933, and, since this progress has been based upon the realities of the business situation, he can see no reason why it should not continue. Unemployment has decreased, railway traffic is steadily increasing, and retail sales have been expanding. Unfortunately, similar progress has not been made uniformly throughout the world, and there are still many influences which are hampering the free flow of international trade. This country is prepared and willing to trade with any country which shows itself ready to do so on a fair basis, but only on reciprocal terms.

Sir WILLIAM LARKE, director of the National Federation of Iron and Steel Manufacturers, is satisfied from the experience of the iron and steel industry during recent months that there are grounds for reasoned optimism that the upward tendency in industrial production and employment will continue. The iron and steel industry, being basic in character, may be accepted as an index of the general industrial position. During the first nine months of the present year, as compared with the first nine months of 1932, steel production in the United Kingdom showed an increase of 27 per cent. The Continental producing countries during the same period showed an increase of 17.6 per cent., thus indicating that the upward tendency, if not world-wide, is at least operating over a wide industrial area. This, he believed, is due in the first instance to the necessity for replenishing world stocks which had become exhausted during the prolonged depression. As a result of this demand, price levels have become firmer, with an upward tendency. This has stimulated new enterprise, desirous of taking advantage of the present low level of prices, which is probably lower to-day than is likely to be seen for many years to come.

Mr. WALTER L. CHANCE, president of the Birmingham Chamber of Commerce, says it is happily possible to-day to assert without fear of contradiction that the trade and industry of this country have taken a definite turn for the better. There is no doubt about it—it is no mere "flash in the pan," but a genuine revival. In this connection, it is fortunate that the British Industries Fair next February comes at the great psychological moment to provide an opportunity for our manufacturers to show just what they can produce to meet the reviving demand which is beginning to encourage increased purchases of all kinds of goods, particularly those of British origin. Many large firms have already increased their demands for space, and it looks as if even the big new extension of the Fair buildings will hardly provide accommodation for all those who mean to seize this peculiarly favourable opportunity for developing their home and overseas business.

### A National Policy Wanted

Sir WILLIAM ALEXANDER, M.P., president of the National Union of Manufacturers, says many of us are more hopeful than we have been for some considerable time. No one can say what the causes of this progressive movement are, but it is probable that they are deeper and more elemental than anything which could be effected by Governments. Our Government has given these causes the chance of operating here by balancing the Budget, by introducing Protection and by laying the foundations of greater inter-Empire trade. What we hope they will do now is, by consultation with the best industrial brains in this country, to formulate a national policy as to the way our great fiscal bargaining power are to be used and as to what steps are to be taken to meet unfair foreign competition such as that at present harassing our manufacturers from Japan. It is vital that we should have a settled plan on both these points if we are to get full advantage from the present upward movement. Given that we are distinctly hopeful, for our people are fundamentally sound and so are our manufacturers.

Sir FRANCIS GOODENOUGH, chairman of the British Commercial Gas Association, is of the opinion that at least our position is sounder than that of any other country in the world at this time and our recovery more assured. It is important, however, that we should not forget the lessons of adversity the moment the turn in our fortunes has come. In the world of commerce not only to-day, but for all time, conditions will be more severely competitive than in the old days and we shall need to pay the closest attention to our marketing principles, policy and personnel if we are to regain and maintain our trade, prosperity and supremacy. Modern days require modern ways. The old haphazard unplanned marketing will not suffice. We have to go to the world (and the British Industries Fair) to sell what the buyer wants—the world no longer comes to us eager to buy just what we choose to make.

# A Steady Improvement in Trade

## Encouraging Employment Figures

THE employment figures for October are encouraging, not so much because they show that 537,000 more people were employed than there were a year ago and that the unemployed on the register were less by 448,000 than in October, 1932, but because they confirm the belief in the steady revival of trade. Commenting upon this, "The Independent," states: "Every month since February, excepting July, has shown a substantial increase in employment and a shrinkage of the unemployed mass. Moreover, the improvement is not restricted to a few trades but is shown by almost all our leading industries, including even coal mining, cotton and ship building. If by effecting really substantial economies in the appalling cost of national and local administration the Government would now strive to encourage manufacturers and merchants to develop their businesses, with some hope of making profits, we might reasonably hope for a far greater extension of employment in the near future. Profligate expenditure and the army of unemployed, which still numbers 2,298,000, are inseparably connected, though politicians will not see it."

# Methyl Bromide as a Fire Extinguisher

## Results of Severe Tests

PEOPLE are tired of seeing illustrations of fires in which the principal matters on view are large masses of printer's ink representing smoke and very little flames. In the accompanying photographs there is not much to see. This is always the case when methyl bromide is used in a proper and efficient manner. The fire consisted of a Royal Air Force mock crashed aeroplane, of dimensions approximately 30 ft. by 30 ft., saturated with petrol and having petrol pumped on to it at the rate of 15 gal. per minute.

Some fire extinguishing appliances consist of elaborate containers of various designs, with little regard to the liquid they carry. In many instances the ratio of the cost of the container to its contents is forty to one, and yet the container does nothing towards putting out the fire. In the case of the extinguisher invented by Mr. Albert Henning, managing director of Hedley and Co. (Leytonstone), Ltd., it is the liquid which is the valuable medium whilst the container is of relatively low cost.

Much ado has been made about fumes generated by fire extinguishing liquids. There is no danger attached to the proper use of methyl bromide. The illustrations show about twenty-five people close to the burning aeroplane. There was an interval of 1 minute 20 seconds between the two photographs, ample time to choke the people present if there had been any dangerous fumes. None were produced, as can be seen by the calm attitude of the onlookers. The 1 minute 20 seconds referred to was the actual time taken by three operators to extinguish the fire. Commencing at the respective ends of the wings and tail, the operators rapidly drove the flames up to the engine, where their combined forces were concentrated on the fire, which was readily extinguished. In the second photograph, unused containers can be seen lying in the foreground. The operators afterwards travelled to London and had a meal without feeling the slightest inconvenience then or at any time following. This has been the constant experience in extinguishing hundreds of fires in a special manner with this product in enclosed rooms and small yards.

In the second of the two photographs a peculiar atmospheric condition is shown. It is that of a low-lying bank of mist over the ground. This is not composed of chemical fumes but simply a bank of fog due to the intense cold produced by the spraying of the liquid causing condensation of the moisture in the atmosphere.

There are extinguishers in the works of the manufacturers which were filled with liquid over thirteen years ago, and which, although untouched, are still ready for use at a moment's notice. There are no mechanical parts, pumps or valves of any description to be manipulated. The makers advocate the use wherever possible of hand extinguishers of the type employed in the Royal Air Force test, which may range in size from half-a-pint to several pints. These can be fixed singly in prominent places in most works, with batteries of containers in a central position. In chemical factories using stills containing highly inflammable vapours a vessel containing a gallon or more of methyl bromide according to the size of the still to be protected should be permanently installed above the still.

*(Royal Air Force—Crown Copyright Reserved.)*

**Mock Crashed Aeroplane in Full Blaze.**

*(Royal Air Force—Crown Copyright Reserved.)*

**The extinguished fire 80 seconds later, showing the peculiar bank of fog due to the intense cold produced by the spraying of Methyl Bromide causing condensation of the moisture in the atmosphere.**

# Notes and Reports from the Societies

## Society of Chemical Industry

### Possible Formation of Road Materials Group

IN the course of a session organised by the Society of Chemical Industry, at the Public Works Congress, Royal Agricultural Hall, London, on November 14, a resolution was passed in favour of considering the formation of a subject group of the Society to deal with road materials. It was intimated that the council of the Society would be favourably disposed towards the proposal.

## Physical Society

### Annual Exhibition of Scientific Instruments

THE twenty-fourth annual exhibition of scientific instruments and apparatus is to be held by the Physical Society, January 9-11, 1934, at the Imperial College of Science and Technology, South Kensington. As in previous years some eighty of the leading instrument firms have accepted invitations to exhibit in the trade section, and the research and experimental section will be representatives of the chief research organisations, including the research laboratories maintained by some manufacturing firms. To encourage craftsmanship and draughtsmanship in the scientific instrument trade, apprentices and learners have again been invited to enter specimens of their work in a competition. Among the discourses to be delivered will be one on " The Instrumental Side of Colorimetry," by J. Guild, A.R.C.S., F.Inst.P. (January 10, at 8 p.m.).

## Petroleum Technologists

### London Meeting : Holley-Mott Washery

SOME notes on the Holley-Mott continuous counter-current washery as applied to petroleum products were given by Mr. E. Thornton, B.Sc., A.I.C., at a meeting of the Institution of Petroleum Technologists held at the Royal Society of Arts, on November 14. At the commencement of his paper Mr. Thornton set out the principles guiding the design and use of treating plants in general. He said a good plant must mix reagent and treated material to give the desired intimacy of contact; it must maintain this desired intimacy of contact for a controlled time; and it must separate reagent and treated material effectively when this time has expired. In addition to these three major requirements it is often desirable, though not essential, that it should be possible to cause the reagents used to flow in a true counter-current manner to the liquid being treated; to use sufficient stages to exhaust the reagent completely; to vary the proportions of the two liquids during admixture, irrespective of the amount of the net reagent actually consumed; to transfer from one stage to another the correct amount of the two liquids easily and simply; to maintain such internal stocks of the reagent as will prevent the bad effect of momentary variations of feed from being reflected in the quality of the finished product; and to control the temperature of reaction easily at all stages.

The advantages claimed by the type of plant described were summarised. In regard to cost, as a counter-current continuous plant it has the usual advantages of such a plant over batch operation, and where the throughput warrants the installation of such a plant, the cost of the Holley-Mott plant compares favourably with that of any alternative design, using pumps, orifices, etc. In operation the usual advantages of counter-current continuous plants in the saving of chemical are achieved. One man operates and keeps clean a plant capable of dealing with well over 2,000 tons of spirit per 24-hour day, and there should be no hesitation in building a plant of double this capacity to be worked by the same amount of labour. The maintenance cost is extremely low, for the absence of multitudinous pumps with liquid immersed glands does away with the commonest source of trouble, such moving parts as are present being robust and working under very good conditions for long life. A plant operated on spirit has worked for 5½ years, has never been emptied and has required no replacement of working parts. Another plant working on the acid treatment of kerosene has worked for over four years with practically no replacement. In common with other continuous plants, the maintenance of steady levels during operation cuts out all breathing losses on spirits and very much reduces fire hazard.

## Chemical Society

### Manchester : A Lecture on Molecule Models

DR. J. E. LENNARD-JONES, professor of theoretical chemistry at Cambridge, delivered an illustrated lecture to the Chemical Society at Manchester University on November 9, his subject being " Molecule's Pictorial." Illustrations were given of the structure of various molecules by means of ingenious wire models which were rotated in a floodlight; the effect showed what is presumed to be the paths of the electrons within the molecular and atomic structure. From the distribution thus shown, said the lecturer, one can derive the probability of finding the electron in any part of the atom. Research in this field was being carried on on two sides: the theoretical study of wave-mechanics and a more practical X-ray investigation. From X-ray analysis very definite material could be obtained concerning the dimensions and structure of the molecule. There was still much work to be done along both these lines, but it was hoped that these independent methods of approach would confirm each other.

## Institution of the Rubber Industry

### London and District Section—Sales Meeting

THE committee of the London and District Section of the Institution of the Rubber Industry announce that the London Advisory Committee for Rubber Research (Ceylon and Malaya) has kindly invited members and their friends to visit the Imperial Institute, London, S.W.7, on Monday, November 27, at 7 p.m. The visit will include an exhibition of short films in the Imperial Institute cinema illustrating the collection of latex and the preparation of raw rubber on the plantation; an inspection of exhibits dealing with rubber growing and preparation in the Ceylon and Malaya Courts of the exhibition galleries; and a visit to the rubber laboratories and a demonstration of the methods employed. Three short papers of a popular character will be read by the technical staff, the subjects being (a) " Properties of Latex," (b) " Utilisation of Latex," and (c) " The marketing of rubber and latex."

### Joint Meeting With Oil and Colour Chemists

At a joint meeting of the Institution of the Rubber Industry and the Oil and Colour Chemists' Association, held at the First Avenue Hotel, London, on November 13, a paper was read by Dr. H. P. Stevens and Mr. Noel Heaton dealing with some investigations into the use of rubber in paint vehicles. Mr. J. A. Frome Wilkinson (president, Oil and Colour Chemists' Association) presided.

The authors confined themselves mainly to the ordinary paints used for house decoration and similar purposes. There was little evidence, they said, that rubber had previously been used successfully in the manufacture of oil or water paints; the expected advantages did not accrue because the viscosity of a rubber sol precluded the use of more than a very small amount in paints and because raw rubber had not the water-resisting qualities frequently but erroneously attributed to it. It appeared obvious that if rubber were to be utilised it must be modified physically so as to reduce the viscosity of its sol to that of a suitable oil or other common paint ingredient. This implied more drastic treatment than mastication. The reduction of viscosity could be effected by the ordinary paint driers; by suitable compounding, the

desired reduction in viscosity, and permanency at the reduced viscosity, might be obtained. The paint driers also acted as oxidation catalysts, causing the rubber film to dry and harden in the same manner as an oil film. Minute amounts of copper, manganese, chromium and vanadium salts, possibly also iron salts, acted as catalysts and brought about profound changes in the physical properties of rubber. It was found that the viscosity of a rubber solution could be reduced by an organic copper salt, such as the stearate or oleate, by merely setting aside in closed vessels without aeration. A number of other metallic salts had a similar effect; of these, cobalt was more effective than copper, manganese was not far removed from copper, and lead was less effective. The catalytic action which the metallic salts mentioned, particularly the linoleates, had on drying oils was of the same nature as on rubber.

It might appear, said Dr. H. P. Stevens, that the introduction of rubber would increase the cost of the paint; but the cost of the rubber must be compared, not with that of the untreated oils, but with the prepared vehicles, the cost of which were of the same order as rubber. Should the latter show an exceptional increase in price, however, a smaller proportion could be used, and the advantage it conferred could thus be retained in great measure.

### Promising Results

Formulæ had been worked out, replacing part of the oil content by rubber, in various recognised formulæ for flat paints, such as linseed oil thinned with white spirit, gold size and turpentine, etc. As a result of experiments, a combination of rubber and stand oil was selected as giving the most promising results. A series of flat white paints was prepared; they brushed out freely and dried to a perfectly smooth flat finish, whereas the controls (in which the rubber was omitted from the formulæ) showed typical brush marks.

The CHAIRMAN, opening the discussion, referred to the action of the linoleate driers and their thinning effect on the paint and asked if the authors had examined the plasticity of their solutions in order to determine whether there was a breakdown in the structure. He also asked whether the paints incorporating rubber had been used for spraying, whether one coat could be applied on top of another, and whether the rubber had any material effect on the hardness of the film. As to durability, he pointed out that in a straight oil paint film breakdown usually occurred, when applied to metals at any rate, along the valleys of the brush marks; inasmuch as the valleys disappeared in the case of a paint film containing the rubber, might there not be an increased durability owing to the more even thickness of the film, or was there a balance between some slight decrease in intrinsic durability and an increase in durability due to the flattening of the film?

Mr. H. W. KEENAN asked whether any particular catalyst was susceptible to only certain types of rubber. Having regard to the attempts made to arrest the progress of the oil film to destruction, he asked if the authors had considered the introduction of rubber as an anti-oxidant.

### The Authors Reply

Dr. STEVENS, replying, said he could not yet give information as to the plasticity of the solution and breakdown of the structure of the rubber, because the products had not been examined closely from a scientific point of view. The effect of the paint drier was first to reduce the viscosity of the rubber in solution, and, when the solution was applied to a surface, it acted as a drier, *i.e.*, it caused hardening of the film. He had little or no experimental evidence as to the egect of anti-oxidants, but anticipated that their inclusion would reduce the effect of the catalyst. As to the use of softened rubbers, inasmuch as such rubbers had been treated to a stage which began to approach that of molten rubber, perhaps the action of the catalyst would be less noticeable, because part of its work had been done for it. But he imagined the effect of heat in producing softened rubber was different from the effect of a catalyst. As to speed of drying, he believed that on the average the rubber paints would dry at about the same rate as other paints.

Mr. NOEL HEATON, who also replied, said there was no difficulty about spraying rubber paints, or applying second coats. With regard to the hardness of the film, he pointed out that the drying oils were still used, as well as rubber, and it was the combination of the two types of vehicles that gave the practical proposition. He agreed with the Chairman, that the uniformity of the film tended to increase durability, but that might be counteracted by the greater flowing properties of rubber paints tending to produce rather a thinner film. He had concluded that there was no material difference between the durability of comparable paints with and without rubber.

---

## Institute of Physics

### Proposed Industrial Physics Conference

THE Board of the Institute of Physics has had under consideration a proposal to hold two or three day periodical conferences or discussions on applications of physics to industry. It is suggested that industrial physicists are desirous of meeting from time to time to discuss problems which they have in common, and to make new contacts and renew old ones. Another useful function of such a conference, it is believed, would be the contribution to the solution of a problem which has arisen in one industry made by the solution of a similar problem in another industry, thereby saving a great deal of repetition of research and unnecessary expense. The views of members and others on the desirability or otherwise of holding such gatherings will be welcomed.

---

## Institute of Chemistry

### Gluckstein Memorial Lecture

DR. HERBERT LEVINSTEIN will deliver the fifth S.M. Gluckstein Memorial Lecture at the Institute, 30 Russell Square, London, W.C.1, on December 15, 1933, at 8 p.m. His subject will be "The Chemist as a Directing Force in Industry." Professor Jocelyn F. Thorpe, D.Sc., F.R.S., president of the Institute, will be in the chair.

### Huddersfield Section

Owing to unforeseen circumstances, Major F. A. Freeth, D.Sc., F.R.S., has had to postpone his lecture on "Drikold" until November 21. This lecture, to be illustrated by lantern slides and demonstrations, was originally arranged for a joint meeting with the Yorkshire Section of the Society of Chemical Industry, at the Technical College, Huddersfield, on Tuesday last. The subject is of particular value to those interested in refrigerants and sources of carbon dioxide

---

## Society of Glass Technology

### Visit to I.C.I. Works at Billingham

BY the courtesy of the directors of Imperial Chemical Industries, Ltd., the next meeting of the Society of Glass Technology will be teld at the Billingham Works of I.C.I. (Fertilizer and Synethetic Products), Ltd., on November 22, when a visit will be paid to the Nitrogen Works of the company, and members will be the guests of the company at luncheon. An informal dinner of members and their friends is being arranged at the Queen's Hotel, Stockton-on-Tees, on November 21, at 7.0 p.m. The 156th ordinary general meeting of the Society will be held November 22, at 1.45 p.m., when the following papers from members of the research staff of Imperial Chemical Industries, Ltd., will be read and discussed: "A Study of Crushing Brittle Solids" (W. F. Carey and C. H. Bosanquet), "The 'Reversible' Thermal Expansion of a Silica Brick" (Dr. J. A. Sugden), "Some Notes on Heat Resisting Metals" (W. B. Inglis).

### London Section: Annual Dinner

The annual dinner of the London Section will be held in the Old Bell Restaurant, Holborn on December 13, at 7 p.m. (morning dress). Tickets (price 4s. 6d., exclusive of wines and gratuities) are now available and may be obtained from the Honorary Secretary of the London Section, Mr. T. C. Crawhall, M.Sc., Science Museum, London, S.W.7.

# British Overseas Chemical Trade in October

## A Still Further Increase in Exports

**Exports of chemicals, drugs, dyes and colours during October were valued at £1,565,144, as compared with £1,369,090 for October, 1932, an increase of £196,054. Imports amounted to £951,378, as compared with £766,960; re-exports were £48,222, as compared with £38,651. For the ten months ending October, 1933, the value of the exports has reached a total of £14,451,461, which is now only £18,274 less than the total for the corresponding period of 1932.**

### Imports

| | Quantities. Month ended October 31, 1932. | 1933. | Value. Month ended October 31, 1932. £ | 1933. £ |
|---|---|---|---|---|
| Acetic anhydride .. cwt. | 252 | 1,061 | 750 | 2,861 |
| Acid, acetic .. tons | 782cwt. | 13,458 | 25,356 | 21,663 |
| Acid, tartaric, including tartrates .. cwt. | 1,600 | 1,430 | 5,967 | 5,329 |
| Bleaching materials ,, | 9,656 | 3,237 | 10,199 | 6,630 |
| Borax .. .. ,, | 9,180 | 9,600 | 4,698 | 5,286 |
| Calcium carbide .. ,, | 85,159 | 80,854 | 51,138 | 44,703 |
| Coal tar products, not elsewhere specified value | — | — | 10,335 | 3,923 |
| Glycerine, crude .. cwt. | — | 2,207 | — | 3,180 |
| Glycerine, distilled ,, | 542 | 241 | 957 | 472 |
| Red lead, orange lead ,, | 1,909 | 1,690 | 1,981 | 1,606 |
| Phosphorus .. ,, | 2,145 | 2,888 | 9,018 | 9,264 |
| Kainite, etc. .. ,, | 375,303 | 305,003 | 64,449 | 60,558 |
| Potassium nitrate (saltpetre) .. .. cwt. | 4,519 | 22,547 | 4,344 | 8,989 |
| Other potass. compounds cwt. | 110,978 | 220,167 | 68,628 | 109,601 |
| Sodium nitrate .. ,, | — | — | — | — |
| Other sod. compounds ,, | 25,744 | 38,155 | 17,677 | 24,495 |
| Cream of tartar .. ,, | 726 | 450 | 2,419 | 1,376 |
| Zinc oxide .. tons | 30 | 80 | 671 | 1,460 |
| Other chemical manufactures .. .. value | — | — | 172,618 | 216,605 |
| Quinine, quinine salts oz. | 48,260 | 33,979 | 5,159 | 2,837 |
| Bark Cinchona (Bark Peruvian, etc.) .. cwt. | 1,767 | 5,031 | 9,565 | 22,465 |
| Other drugs .. value | — | — | 69,339 | 105,620 |
| Intermediate coal tar products used in dye manufacture .. cwt. | 101 | 408 | 385 | 1,874 |
| Alizarine and alizarine red cwt. | — | — | — | — |
| Indigo, synthetic .. ,, | — | — | — | — |
| Finished dyestuffs ,, | 2,229 | 4,744 | 47,256 | 116,247 |
| Cutch .. .. ,, | 1,341 | 2,425 | 1,421 | 2,641 |
| Other dye extracts ,, | 963 | 2,392 | 3,444 | 8,595 |
| Indigo, natural .. ,, | 10 | 7 | 141 | 155 |
| Extracts for tanning ,, | 123,149 | 77,908 | 76,745 | 55,245 |
| Barytes, ground .. ,, | 22,859 | 22,954 | 4,351 | 4,763 |
| White lead (dry) .. ,, | 3,020 | 6,407 | 3,914 | 7,693 |
| Other painters' colours and materials .. cwt. | 70,117 | 92,794 | 94,635 | 95,242 |
| TOTAL .. value | — | — | 766,960 | 951,378 |

### Exports

| | Quantities. Month ended October 31, 1932. | 1933. | Value. Month ended October 31, 1932. £ | 1933. £ |
|---|---|---|---|---|
| Acid, sulphuric .. cwt. | 3,826 | 2,422 | 2,114 | 1,819 |
| Acid, tartaric, including tartrates .. cwt. | 881 | 917 | 3,905 | 4,276 |
| Ammonium chloride ,, | 221 | 217 | 4,772 | 4,266 |
| Ammonium sulphate tons | 27,642 | 36,300 | 121,658 | 230,443 |
| Bleaching powder (chloride of lime) .. .. cwt. | 59,429 | 52,070 | 16,217 | 17,262 |
| COAL TAR PRODUCTS— | | | | |
| Anthracene .. cwt. | 6 | — | 8 | — |
| Benzol and toluol gal. | 3,029 | 8,079 | 413 | 1,000 |
| Carbolic acid (crude) ,, | 6,945 | 14,578 | 1,248 | 1,758 |
| Carbolic acid (cryst.) ,, | 1,225 | 1,238 | 4,537 | 5,344 |
| Cresylic acid .. ,, | 98,710 | 153,100 | 11,151 | 11,211 |
| Naphtha .. ,, | 12,248 | 5,034 | 813 | 375 |
| Naphthalene (excluding naphthalene oil) cwt. | 8,430 | 8,961 | 2,187 | 2,660 |
| Tar oil, creosote, etc. gal. | 1,874,848 | 454,683 | 32,271 | 10,421 |
| Other sorts .. cwt. | 21,379 | 14,881 | 13,214 | 8,555 |
| COAL TAR PRODUCTS value | — | — | 65,842 | 41,324 |
| Copper, sulphate of tons | 218 | 400 | 3,597 | 6,675 |
| Disinfectants, etc. cwt. | 40,962 | 31,985 | 99,513 | 71,995 |
| Glycerine, crude .. ,, | 2,238 | 1,153 | 2,419 | 1,396 |
| Glycerine, distilled ,, | 13,839 | 20,186 | 26,509 | 42,930 |
| Potassium chromate and bichromate .. cwt. | 729 | 1,544 | 1,853 | 3,682 |
| Potassium nitrate (saltpetre) .. .. cwt. | 1,727 | 3,542 | 2,875 | 5,111 |
| Other potass. compounds cwt. | 1,153 | 3,827 | 6,644 | 10,843 |
| Sodium carbonate, including crystals, ash and bicarbonate .. cwt. | 252,069 | 237,544 | 65,941 | 70,635 |
| Caustic soda .. ,, | 193,221 | 146,512 | 111,656 | 99,469 |
| Sodium chromate and bichromate .. cwt. | 1,543 | 1,883 | 2,911 | 4,152 |
| Sodium sulphate, including salt cake .. cwt. | 42,792 | 132,179 | 5,895 | 14,331 |
| Other sod. compounds ,, | 80,417 | 79,316 | 66,226 | 78,298 |
| Zinc oxide .. tons | 1,492 | 794 | 26,725 | 16,517 |
| Other chemical manufactures .. .. value | — | — | 228,475 | 280,154 |
| Quinine and quinine salts oz. | 68,032 | 102,245 | 9,450 | 11,186 |
| Other drugs .. value | — | — | 193,401 | 222,830 |
| Dyes and dyestuffs (coal tar) .. .. cwt. | 13,225 | 9,151 | 91,289 | 101,886 |
| Other dyestuffs .. ,, | 17,296 | 21,887 | 15,885 | 19,970 |
| TOTAL .. ,, | 30,521 | 31,038 | 107,174 | 121,856 |
| Barytes, ground .. ,, | 3,183 | 1,548 | 1,349 | 702 |
| White lead (dry) .. ,, | 1,822 | 2,089 | 3,188 | 3,758 |
| Paints and colours in paste form .. cwt. | 19,737 | 19,221 | 33,360 | 31,961 |
| Paints and enamels prepared .. .. cwt. | 28,124 | 32,468 | 77,752 | 90,254 |
| Other painters' colours and materials .. cwt. | 45,599 | 46,124 | 77,669 | 77,019 |
| TOTAL .. value | — | — | 1,369,090 | 1,565,144 |

### Re-Exports

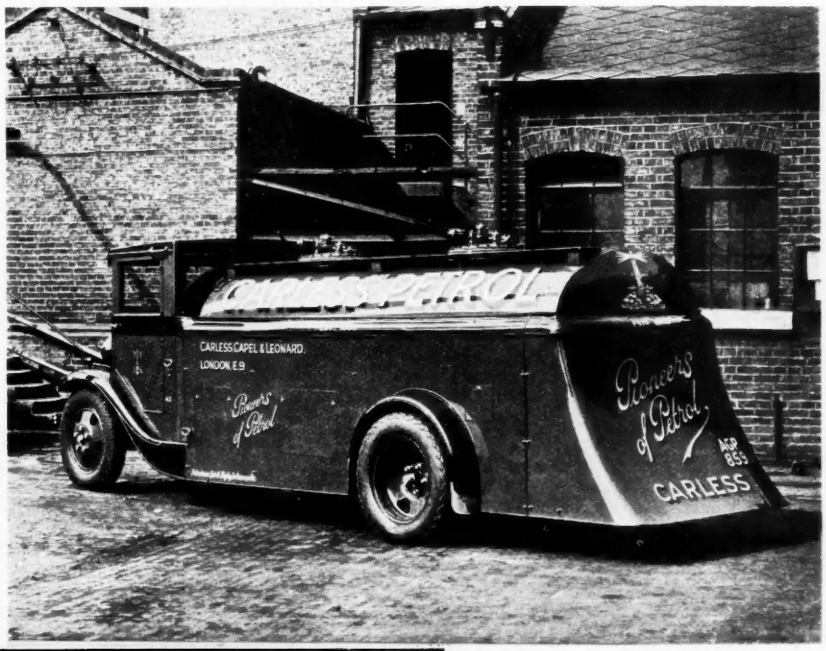
| | Quantities. Month ended October 31, 1932. | 1933. | Value. Month ended October 31, 1932. £ | 1933. £ |
|---|---|---|---|---|
| Acid, tartaric, including tartrates .. cwt. | 45 | 48 | 239 | 286 |
| Borax .. .. ,, | 30 | 8 | 18 | 6 |
| Coal tar products, not elsewhere specified value | — | — | 8 | 11 |
| Potassium nitrate (saltpetre) .. .. cwt. | 69 | 68 | 84 | 118 |
| Sodium nitrate .. ,, | 14,874 | 1,593 | 4,996 | 556 |
| Tartar, cream of .. ,, | 162 | 147 | 667 | 563 |
| Other chemical manufactures .. .. value | — | — | 8,675 | 19,976 |
| Quinine, quinine salts oz. | 4,950 | 3,907 | 681 | 432 |
| Bark Cinchona (Bark Peruvian, etc.) .. cwt. | 271 | 220 | 2,681 | 2,604 |
| Other drugs .. value | — | — | 16,508 | 21,633 |
| Cutch .. .. ,, | 102 | 144 | 140 | 184 |
| Other dye extracts ,, | 73 | 46 | 308 | 202 |
| Indigo, natural .. ,, | 6 | 6 | 129 | 155 |
| Extracts for tanning ,, | 347 | 14 | 325 | 12 |
| Painters' colours and materials .. .. cwt. | 224 | 738 | 580 | 1,275 |
| TOTAL .. value | — | — | 38,651 | 48,222 |

# Works Equipment News

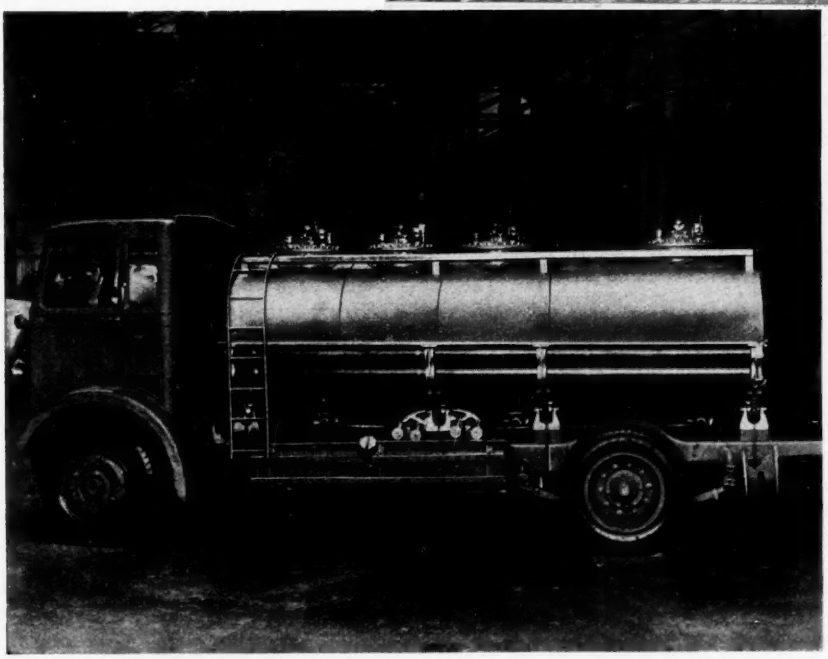
## Some Notable Developments in Transport Tanks

THE Aluminium Plant and Vessel Co., Ltd.—better known to users of transport as A.P.V., Ltd.—exhibited at the Commercial Motor Transport Exhibition. They displayed a 1,000 gal. aluminium tank mounted on one of the latest 2½ ton Guy chassis. Their object was to show that a comparatively large bulk of liquid can, by the utilisation of an aluminium tank, be transported on a vehicle which for taxation and speed regulation purposes comes under the limit of 2½ tons unladen weight and withal is extremely reasonable in price. It is fairly safe to assert that the particular vehicle they exhibited is the only 1,000 gal. petroleum road tank yet produced that can legally travel at 30 miles per hour and pay a tax as low as £30 per annum.

The tank, which is of elliptical shape and provided with two compartments, is constructed of pure aluminium. As might be expected of the pioneers of aluminium welding, it is of welded construction throughout. The fittings have all been specially designed by A.P.V. and are of particular interest. In every case a special aluminium alloy has been used to achieve the dual object of light weight and considerable strength. The method of mounting the tank is of interest. The shell is supported on cast aluminium alloy bearers which are attached to the chassis frame through special brackets and Silentblocs of ingenious design. The tank is completely insulated from road shocks of any kind. The manway covers, fill and dip pipes, foot valves, cocks, etc., have been designed in accordance with existing regulations covering the bulk transport of petroleum. We understand these can also be supplied for use with fuel oil, milk, beer and various other liquids. The chassis is the very latest Guy "Wolf" type. It is nominally rated as a 2½ tonner, and it is noteworthy for its fine performance and remarkably low weight. Exclusive of cab, this only amounts to 31 cwt.



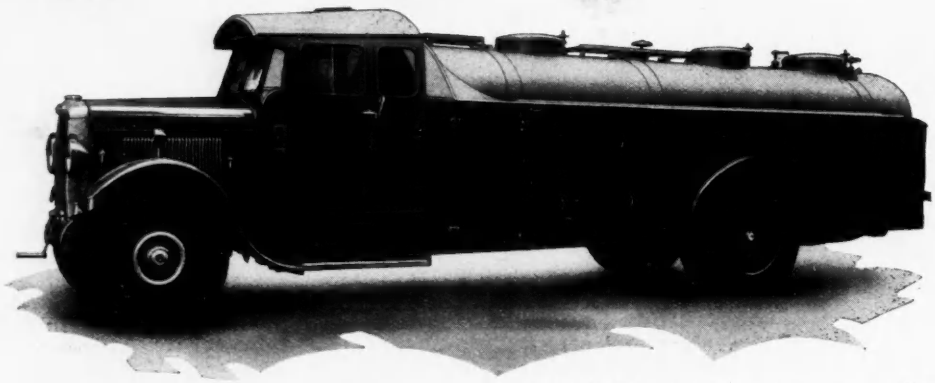

Two-compartment Petrol Tank with a capacity of 1,000 gal. (Aluminium Plant and Vessel Co. Ltd.).

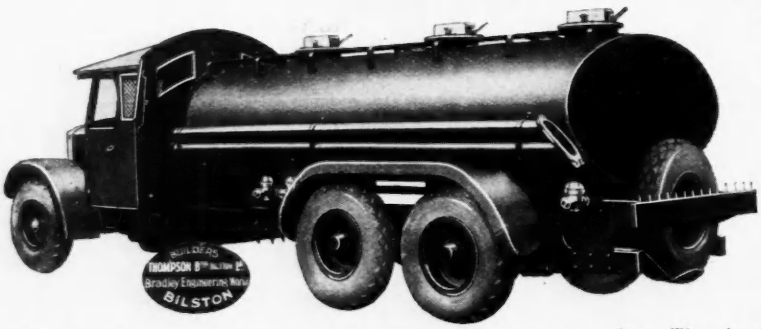


Petrol tank with Four Compartments and a capacity of 1,300 gal. (Aluminium Plant and Vessel Co Ltd)

New designs in road tanks for the transport of liquors were exhibited by Thompson Bros. (Bilston), Ltd., at the recent Commercial Motor Transport Exhibition. Fig. 1 shows a 1,000 gal. triple compartment lubricating oil tank mounted on a Leyland chassis. This tank is suitable for the carrying of heavy oils, etc. It has been specially designed to give a streamline effect and the panelling makes an attractive area for advertisement. The small panel in the side is easily removable, exposing the cocks by means of which the tank is emptied. Filling, measuring and venting arrangements are incorporated in the lids. Fig. 2 shows a 2,000 gal. four compartment steel tank mounted on Scammell frameless chassis. This tank was supplied to carry spirit, but similar ones are in use for solvents, etc., while pressure type tankers are used for glucose. A tank of this type has been fabricated by Thompson Bros. (Bilston), Ltd., from aluminium alloy and

is used for carrying paraffin. A typical T.B. elliptical (registered design) tanker mounted on a Thornycroft chassis is illustrated in Fig. 3. The elliptical section gives a strong tank with a low centre of gravity. Tanks of this type are made in mild steel, aluminium, stainless steel, etc., and are used for the transport of milk, beer, vinegar, margarine, glucose, acids, alkalis, etc. Patented features are embodied in the lids, valves and vents. In the case of petrol and similar inflammable liquids, firescreens are fitted and the tanks made to comply fully with Home Office regulations.






Above—Fig. 2. Four-compartment Steel Tank (2,000 gal. capacity) on Scammell chassis.

Right—Fig. 1. Triple compartment Oil Tank on Leyland chassis.

Below—Fig. 3. Elliptical Tanker on Thornycroft chassis.

## Unit Heaters

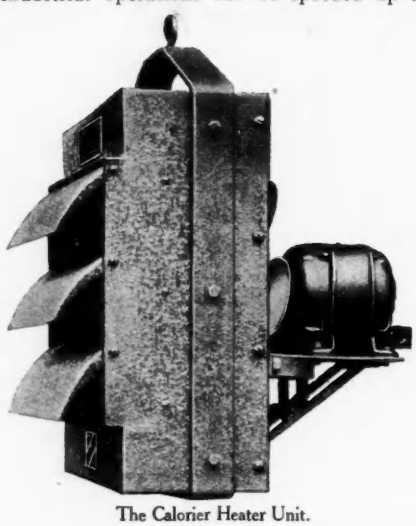
NEARLY 30 years ago The Standard and Pochin Bros., Ltd., introduced to the British market the first British made unit heater, known as the "Stanlock" heater. Since those early days, continuous progress has been made; modification, improvement, new models and the elimination of minor faults, all having received careful attention, whilst considerable knowledge relative to their application has been acquired. Equipped with the experience so gained, this firm has now placed the "Calorier" unit heater on the market.

These heaters embody many unique points of construction, and are built up to the traditions of British engineering. The heating element is made entirely of copper and is produced without welded or soldered joint. Heavy gauge solid drawn copper tubing is used to convey steam, and transmission is rapidly obtained to the air stream. The copper gills are attached to the tube wall by a mechanical process, and they become an integral part of the tube, being positively held in position throughout their entire length. The amount of heating surface obtained per foot run of tube is high, and permits rapid and even distribution. A number of the tubes are assembled into close-grained cast iron headers. One header is located at the top into which the steam or hot water is fed, and one at the base to which the return pipe is connected. The tubes are expanded into position, a good tight joint being ensured. The assembled heater is tested to withstand 300 lb. hydraulic pressure and is suitable in all respects for steam pressure of 100 lb. per sq. in.

The distributing fan forms no small feature of the unit. It is not, as is so often the case, merely flat sheet metal strips bolted to a common centre. The blades are designed in such a manner that maximum air volume is delivered for a nominal amount of power. This condition is assisted by the elimination of corrugations on the heating tubes, the "Flatfin" ensuring a definite and easy path to the air stream.

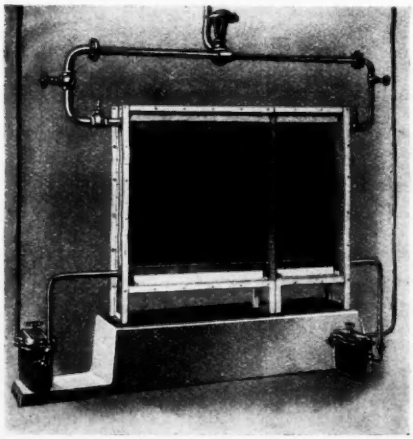
The "Calorier" unit heaters will be found of outstanding value in obtaining warm and comfortable conditions; particularly so when it is desirable to retain all available floor space for machinery or storage. They are arranged to direct warm air toward floor level and distribute the heat where it can best fulfil the purpose of its application. Supply pipes are few and relatively small in size. The simplicity of the system makes it an easy one to maintain, and automatic control can be readily applied.

Many industrial operations can be speeded up and well



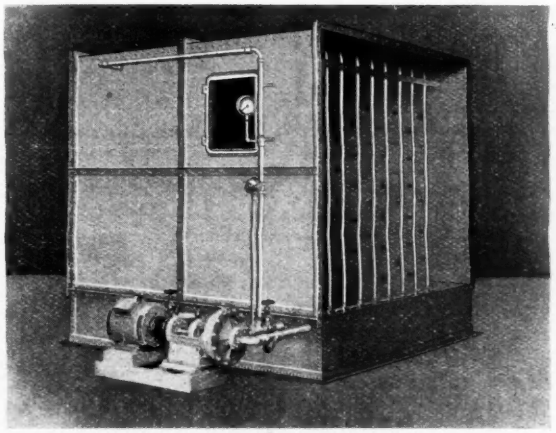
The Calorier Heater Unit.

served by the application of " Calorier " heaters. Not only are they compactly arranged, but the heat output obtained from a relatively small area is greatly in excess of that from pipe coils and cast iron radiating surface. The heater illustrated is capable of condensing 730 lb. of steam per hour, heating the air from 60° F. to 230° F. for a consumption of less than 1 h.p. For drying purposes equipment of this description renders prolonged and satisfactory service.



" Standard " Air Heating Battery.

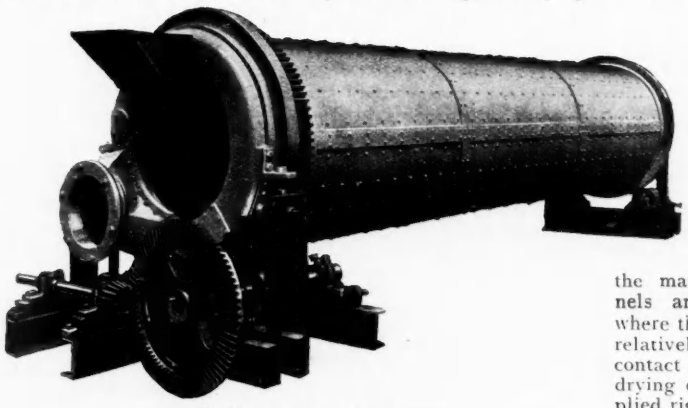
Battery heaters, used mostly in connection with centrifugal fan systems, are ideally constructed, and can be built up to suit almost any desired form or section. Their range is almost unlimited, and, embodying the " Flatfin " element, they are capable of producing a tremendous rise in temperature whilst occupying small space. The limiting height of any one section is 6 ft. 9 in., but an infinite variety of areas is made possible by the multiple assembly of sections. Built up without soldered joint or welded connection, these heating batteries take their place in the forefront of heating equipment. Their test pressure is 300 lb. per sq. in. and they will render every service throughout a long life. The heating element, being of all copper construction, eliminates rapid deterioration.



" Standard " Air Washing and Conditioning Chamber.

## A Rotary Dryer with Unlimited Applications

There are many types of drying plant available for general industrial purposes, and where drying is not one of the prime operations in the production of an article, the manufacturer often has no ready means to effect it. Nor does he take the responsibility of choosing a dryer that will be best for his purpose. In some cases he merely hands the problem over to one of the firms who have supplied other machinery, and they construct some form of dryer, probably designed for the purpose, which they think will, and often does, fulfil requirements. Nevertheless, in recent years the design of drying plant has received a considerable amount of scientific attention, and dryers are available to deal with an almost unlimited range of materials.



The Rotary Louvre Dryer.

One dryer which has an almost unlimited application is the rotary louvre dryer supplied by Dunford and Elliott (Sheffield), Ltd. Over fifty of these dryers have been installed since they were first placed on the market four years ago. In use they are operating on materials of such widely differing characters as coke, cotton, salt and sand. It will be seen that this dryer consists of a short rotating drum fixed horizontally, which is lined with a series of peripheral channels each covered with a tangential plate and constructed in such a manner that the material resting inside the drum cannot fall back into the peripheral channels. As the drum rotates, the material to be dried banks up on one side and the hot air for drying is allowed to enter those channels which lie immediately under this bed of material. This air is introduced through a stationary head piece which communicates only with the channels under the bed, and acts as a seal to prevent the hot air entering the other channels. Consequently all the air must pass through the material, giving the most favourable conditions possible for drying. The depth of bed in the drum is so controlled that there is no sliding action; the material travels up to its angle of repose and then tumbles over on to itself so that a slightly agitated but quite free mas is maintained, which not only allows free percolation of the air, but prevents sliding and wear on the inside of the drum if the material being dried is of an abrasive nature.

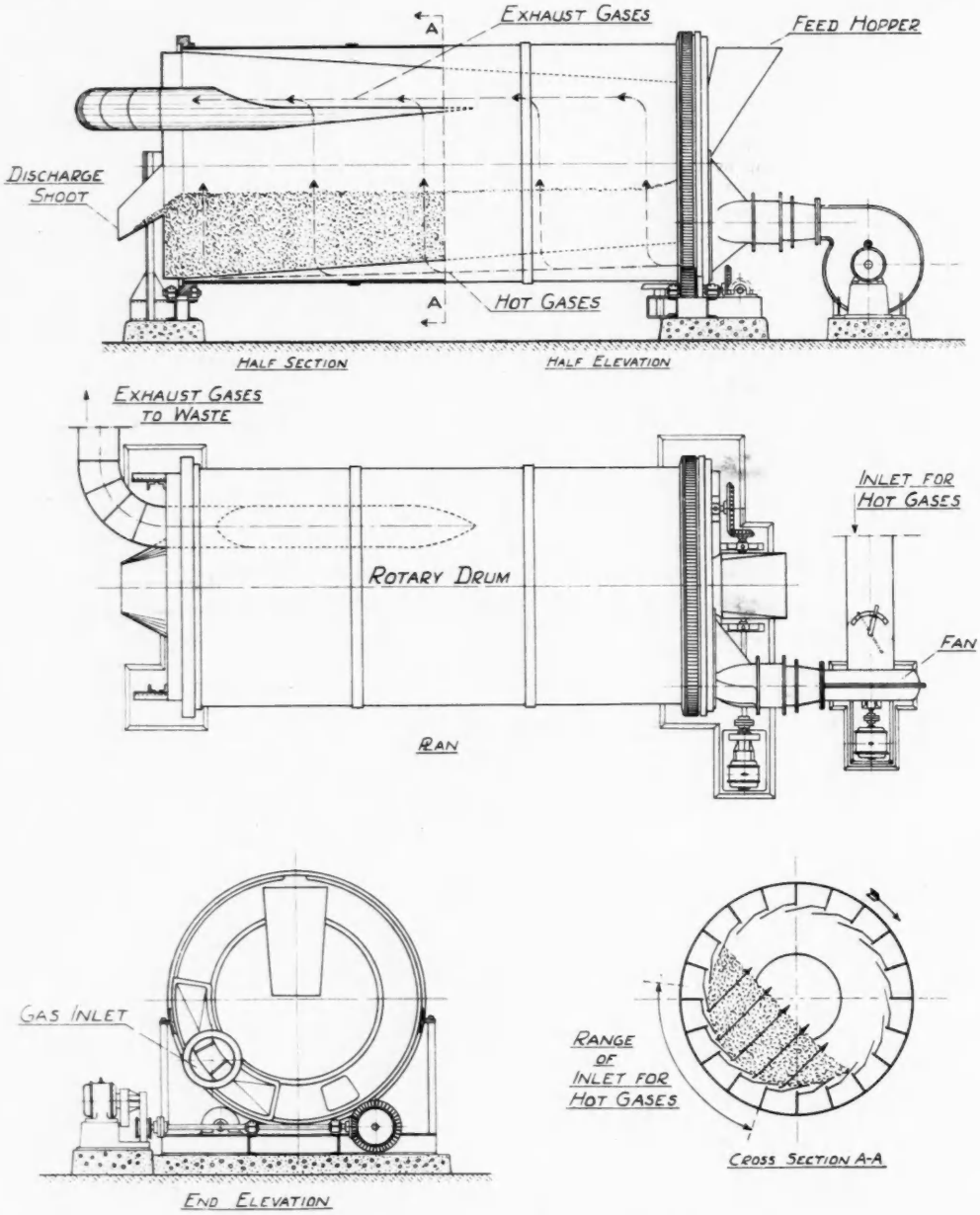
The peripheral channels tapper from the feed end of the drum to the discharge end and the rotation of the drum is sufficient to carry the material forward. Near to the feed end the channels are deeper than at the discharge end, so that where the material enters the drum and is wettest, the bed is relatively shallow and the bulk of the drying air comes into contact with the material. In this way high initial rates of drying can be obtained. The hot air is, however, still supplied right up to the end of the drum until drying is complete, so that a high difference in vapour pressure is maintained and low final moistures can also be obtained. The rotary louvre dryer, therefore, combines the advantages of the two older forms of rotary dryer, the parallel-flow type in which the air and material pass forward in the same direction, and the counter-flow in which the material travels in one direction and the gases pass in the oposite direction. It combines these two advantages by supplying fresh warm air over the whole length of the drum.

Mechanically the rotary louvre dryer is of very simple construction. Its rate of revolution varies from about 2 r.p.m.

in the small sizes (2 ft. 6 in. diameter) up to about ¾ r.p.m. in the largest size (11 ft. 2 in. diameter). This low rate of revolution results in minimum wear and tear and maintenance costs on the driving gear and body of the dryer, and there is no complicated internal platework. The internal ribs, which constitute the peripheral channels, give a strong robust construction, and only short lengths of drum are used, *e.g.*, about two to three times the diameter.

amount being dried in such dryers now amounting to 500 tons a day), sodium sulphite, sodium carbonate, sodium bicarbonate, ammonia nitrate, saltpetre, as well as various vegetable waste materials.

In the food industry the rotary louvre dryer is finding a number of extensive applications owing, not only to the high efficiency of the drying, but to the absolute uniformity in the product, and the small proportion of breakage of the material.



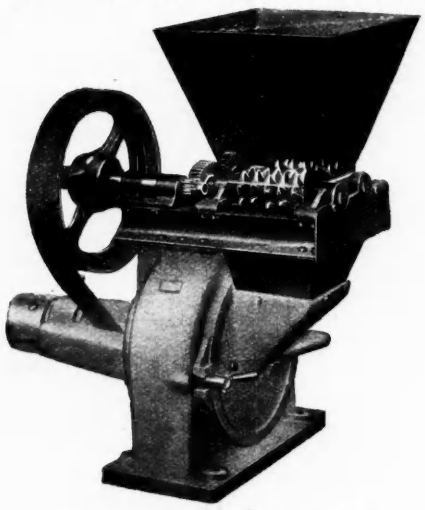

**Diagrammatic Arrangement of the Rotary Louvre Dryer.**

So far as the chemical industry is concerned, the question of corrosion is of considerable importance, and it is interesting to note that this dryer can be constructed with a lining of copper or aluminium; alternatively the whole of the inside of the dryer can be lined with rubber. A rubber-lined drum is in use for drying chloride of ammonia; metallic linings are in use where contact with iron is likely to be detrimental, *e.g.*, with barks for tanning purposes, soap flakes, etc. The dryer is also in use for drying sulphate of ammonia (the total

Food products now being dried include puffed wheat, puffed rice, maize flakes, cocoa nibs, cooked wheat, sago flour, sugar, lemonade crystals, and various meals. In the artificial silk and textile industries, the dryer is in use for drying bleached and washed cotton, and cotton pulp for rayon manufacture. Here increased attention is being paid to the need for attaining the lowest possible moisture content and two large dryers which are in use for this purpose have proved to be capable of reducing moisture content to 2 per cent.

## The Pulmac Mill

THE Pulmac mill, which is supplied by International Pulverisers, Ltd., is not merely an impact mill. Its operation is better described as one of shearing and grinding. It is capable of reducing material to an impalpable dust in one throughput, and in doing so it is claimed by the makers to take less power and give greater output than other mills which are in use. The patented Pulmac drum dispenses with perforated sieves and embodies air separation in the mill, ensuring uniformity of fineness with increased output. The clearance between rotor and stator crowns can be adjusted (to the finest limits) in one minute by a patented adjustment device. The Pulmac grinds material against material; this is one of the important features of the mill. The grinding crowns are of chrome nickel or manganese steel, which stand up to the most abrasive material, but any wear taking place on the crowns in course of time can be taken up by the clearance adjustment. The maximum duty is performed near the shaft by



The Pulmac Mill with Pre-Crusher Feed.

a shearing action, and not at the periphery, hence less power is absorbed. Each seration on the grinding rings and beaters has a cutting edge; these multiple cutting edges with their shearing action ensure great size reduction for power. When rasped crowns are substituted for the standard crowns, the Pulmac mill is converted into a highly efficient instrument for grinding rubber and similar materials.

To arrive at the output of the smaller sizes of mills, the following scale is given as an approximate guide:—

| | | |
|---|---|---|
| P4 | 1,000 lb. | per hour. |
| P3 | 600 lb. | ,, ,, |
| P2 | 250 lb. | ,, ,, |
| P1 | 80 lb. | ,, ,, |

This scale is only approximate, but in most cases correct. To give a rough idea of the capabilities of the Pulmac mill, the following list of outputs for the P4 size mill has been supplied by the makers:—

| Material. | Output lb. per hr. | H.P. | Material. | Output lb. per hr. | H.P. |
|---|---|---|---|---|---|
| Barytes ... ... | 2000 | 25 | Gelatin ... ... | 600 | 15 |
| Bone ash ... | 1750 | 20 | Gypsum (calcined) | 4840 | 20 |
| China clay ... | 3-5 tons | 25 | Gypsum (raw) | 5000 | 20 |
| Cork (Mill P4S) | 300-500 | 25 | Maize ... ... | 1200 | 25 |
| Chalk (dried) ... | 4840 | 25 | Rubber (unvulcanised (Mill P4S) | 200 | 25 |
| Coal ... ... | 2240 | 20 | Wood chips ... | 900 | 20 |
| Glass ... ... | 2240 | 15 | | | |

## Perforated Metal and Woven Wire

AN extensive range of perforated metals is being shown by G. A. Harvey and Co. (London), Ltd., at the Public Works, Roads and Transport Congress and Exhibition which opened at the Royal Agricultural Hall, Islington, on November 13. This firm specialises in perforated metal and woven wire suitable for screening, grinding, separating and filtering such widely different commodities as coal, coke, gravel, ore, sugar, food products and fine chemicals. Another extremely interesting exhibit is Harco patent metalace. This is a new achievement in wire-weaving. In ordinary weaving, whether of wire, cotton or silk, the strands run at right angles to each other. Now, however, by means of machinery which G. A. Harvey and Co. have built, additional strands are incorporated diagonally, with the result that woven designs of a highly ornamental character can be produced. This new material combines durability with artistic effect, and is eminently suitable for a wide variety of purposes. Wirework of various kinds for industrial requirements is also a speciality of this firm and amongst their manufactures in this line are wirework, machinery and belt guards, radiator covers, pipe guards, partitions, baskets and carriers. Other exhibits comprise mild steel gutters, ventilators and gilled tubes. The last mentioned are of particular interest to all concerned with heat transfer problems in connection with ventilating, drying, heating, cooling and electrical equipment. Manufactured from high grade mild steel, these tubes are much lighter than those of cast iron and the inner edge of the gills being crimped, the surface of contact with the tube is increased.

## The Problem of the Rusty Nut

SO much time is wasted over the removal of corroded bolts, that the introduction of liquids which are capable of "cutting" rust have always been welcomed by engineers. "Eezit," which is supplied by J. Bennett Heyde and Co., is a penetrating oil which contains grit-free graphite and it readily penetrates between tight, releasable metal surfaces. It will be found especially useful for loosening nuts and bolts, keys, pulleys, valves, plugs, pipe joints and all other metal parts which have "seized" as a result of rusty conditions or which have become heat-bound. This product, moreover, is British made and is supplied in screw-capped tins (½ pint to 1 gallon) ready for immediate use. The mechanic in the works garage will also find "Eezit" of great service, as there are many points on a motor body to which the atmosphere and dampness can gain access to the detriment of metal components.

# The New Poisons Board

### Sir Gerald Bellhouse Appointed Chairman

THE Home Secretary announces that he has appointed Sir Gerald Bellhouse, C.B.E., to be chairman of the Poisons Board established under Section 16 of the Pharmacy and Poisons Act, 1933, and that the board has now been constituted as follows:—

Sir Gerald Bellhouse, C.B.E. (chairman), Sir Walter Greaves-Lord, K.C., M.P., Sir William George Lobjoit, O.B.E., J.P., and M. H. Whitelegge (appointed by the Home Secretary).

J. M. Johnston, M.B., F.R.C.S. Edin. (appointed by the Secretary for Scotland).

J. N. Beckett and G. F. McCleary, M.D. (appointed by the Minister of Health).

H. E. Dale, C.B. (appointed by the Minister of Agriculture and Fisheries).

Sir Robert Robertson, K.B.E., D.Sc., LL.D., F.R.S. (or deputy), ex officio as Government Chemist.

J. H. Franklin, H. N. Linstead, G. A. Mallinson, E. T. Neathercoat, C.B.E., J.P., and P. Sparks (appointed by the Pharmaceutical Society of Great Britain).

Sir William H. Willcox, K.C.I.E., C.B., C.M.G., M.D., B.Sc. (appointed by the Royal College of Physicians of London).

R. Stockman, M.D., LL.D., F.R.C.P. Edin. (appointed by the Royal College of Physicians of Edinburgh).

S. A. Smith, M.D., M.R.C.P., D.P.H. (appointed by the General Medical Council).

G. Roche Lynch, O.B.E., M.B., F.I.C. (appointed by the Council of the Institute of Chemistry).

J. W. Bone, M.D. (appointed by the British Medical Association).

The duties of the Board are to prepare for the approval of the Home Secretary a list of the substances which are to be treated as poisons for the purposes of the Act and generally to advise the Home Secretary in regard to the rules to be made for the control of poisons.

# News from the Allied Industries

## Rubber

THE RUBBER WORKS of Campbell, Ashnach and Co., Glasgow, which were acquired by the Dunlop Rubber Company six years ago, are to be transferred to Manchester and London. Campbell, Ashnach and Co. was one of the most successful businesses of its kind in the city and employed 300 to 400 workers. The Dunlop Company is centralising the production of waterproof garments and other rubber articles in which the firm of Campbell, Ashnach and Co. specialises.

THE DUNLOP RUBBER CO., LTD., have sent out to holders of 5½ per cent. first mortgage debenture stock particulars of the £3,500,000 new 4 per cent. debenture stock, 1944-74, which they have decided to create to provide for the redemption of the 5½ per cent. stock now outstanding. The company make alternative offers in exchange for each £100 nominal stock of (a) £60 mominal new 4 per cent. debenture stock fully paid and £46 8s. in cash or (b) £106 8s. in cash. The sum of approximately £2,000,000 required to complete the redemption of the existing stock will be provided out of the company's cash resources.

## Mineral Oil

WORLD MARKET CONDITIONS, combined with high internal taxation, which has virtually removed the protection that the indigenous industry formerly enjoyed in India, continue to handicap the operations of the company in Burma, says the report for the year to July 31 last of the British Burmah Petroleum Co., Ltd. The board has decided that the company's development programme must be drastically curtailed until conditions improve and again offer a reasonable prospect of a profitable return to justify further expenditure. For the second year in succession shareholders are to receive no dividend. The net profit for the twelve months ended July last is down from £44,110 to £34,377. Including the amount brought forward there is a disposable balance of £43,896, of which £41,562 is appropriated to debenture sinking fund account, the small surplus of £1,334 being carried forward. The low prices ruling for kerosene in India persisted throughout the year, and prices for benzine fell considerably towards the end of the twelve months. Intense competition from Russian oil and the surplus production of other fields has continued.

## Fertilisers

PRESIDING AT THE MEETING of Lawes Chemical Manure Co., Ltd., on November 8, Mr. F. A. Perkins said that, owing to the increased sales, they had had to extend the works at Barking, and that extension would be completed in time to deal with the heavy demand which they were experiencing this autumn. Not only had the trading of the parent company been profitable, but both their subsidiary companies had also made profits. As regarded their trading in South America, the remittances of their moneys from there had been proceeding smoothly, and since the closing of the financial year they had received very substantial remittances from that source, thus reducing debtors and increasing their bank balance.

A USEFUL REVIEW of the position of the artificial fertiliser industry throughout the world by Dr. Peter Waller, of Berlin, has been published by the Svenska Handelsbanken, Stockholm, Sweden. The greater portion of this publication is devoted to the nitrogen industry, including a discussion of the development and economics of the synthetic nitrogen industry, the conclusion of the international agreements, statistics of the export trade, and an account of the Chilean Government's plans for maintaing the natural nitrate industry. The section devoted to potash fertilisers describes the results of the world crisis on the German and French production and sales, with the consequent need for rationalisation of the industry, and estimates the probable effect of competition from Spain, Poland, United States, and the Dead Sea. Phosphatic fertiliser statistics include the production figures for raw phosphates, superphosphates, and basic slag to the year 1931, and the chapter devoted to this subject briefly summarises the world trade in these products.

## Distilling

AT AN EXTRAORDINARY MEETING of P. Mackenzie and Co., Distillers, Ltd., held in Edinburgh, on November 10, it was resolved to wind up as a members' voluntary liquidation.

## Artificial Silk

DR. HENRY DREYFUS had some encouraging news for shareholders of British Celanese, Ltd., at the general meeting held in London, on November 9. Since the beginning of the current financial year, the volume of business had developed to an extent larger than at any time in the history of the company; profits for the first four months, before depreciation, were in excess of the total profit of last year. The prospects of the American Celanese Co. and the Canadian Celanese Co., in which the company is largely interested, were reported to be excellent. A large amount has again been written off for research and advertising, namely, £108,215, as against £100,590 in the previous year. The development of the new products and the improvements which have been made in many directions are the natural result of the research work undertaken. This research, therefore, will exert an important influence on the company's future prosperity.

## China Clay

THE CHINA CLAY SHIPMENTS for October provide further evidence of improvement and the varied destinations of the consignments that were despatched from the Cornish ports fully indicate the general character of the growing demand for china clay. In September, 133 vessels were employed in carrying the cargoes to home and overseas destinations, of these 57 went from Fowey, 54 from Par, and 17 from Charlestown. The increased demand is attributed to the keener activity of the paper making, pottery, cotton, and chemical industries at home and abroad. Home manufacturers using china clay who are assisted by tariffs being among those increasing their consumption of china clay. Details of October shipments are as follows:—Fowey, 38,183 tons china clay, 1,506 tons china stone, 2,279 tons of ball clay, a total for this port of 42,058 tons, against 32,662 tons in the previous month, and 29,243 tons in October, 1932. Par, 8,330 tons of china clay, 1,295 tons of china stone. Charlestown, 5,024 tons china clay, 336 tons china stone. Penzance, 524 tons of china clay; Looe, 301 tons of china clay; Newham, 90 tons of china clay; Plymouth, 83 tons of china clay; by rail to destination, 5,387 tons of china clay, making a total of 63,459 tons compared with 56,629 tons in the previous month of September and 63,438 tons in August.

## Iron and Steel

THERE WERE SEVENTY-FOUR FURNACES in blast at the end of October, the same number as at the beginning of the month, two furnaces having been blown in and two having ceased operations during the month. The production of pig-iron in October amounted to 373,300 tons, compared with 359,700 tons in September and 275,600 tons in October, 1932. The production includes 102,400 tons of hematite, 175,400 tons of basic; 78,500 tons of foundry, and 8,500 tons of forge pig-iron. The output of steel ingots and castings in October amounted to 668,300 tons, compared with 669,000 in September, and 439,800 tons in October, 1932.

IN THE CHANCERY DIVISION, on November 13, Mr. Justice Maugham had before him a petition by Dorman Long and Co., Ltd., for the sanction of the Court to a proposed reduction of its capital from £11,248,146 to £1,750,678 and to a scheme of arrangement for the acquisition of the assets of the South Durham Steel and Iron Co., Ltd., and a petition by the South Durham Steel and Iron Co. for sanction to the scheme. The petitions were opposed by Mr. Harold Christie, on behalf of 106 debenture-holders totalling £133,000 in Dorman Long and Co., and by Mr. Morton, K.C., for dissentient shareholders in the South Durham Co. It was agreed that both petitions should come on for hearing on November 22.

# Inventions in the Chemical Industry

## Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

### Specifications Accepted with Dates of Application

CYANIDES, production.—E. J. Pranke. Jan. 30, 1932. 400,949.

AZO DYESTUFFS, water-soluble, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). March 16, 1932. 400,920-2.

SILVER HALIDE emulsion layers, sensitising.—I. G. Farbenindustrie. March 27, 1931. 400,951.

ALIPHATIC ACIDS, production of concentrated.—H. Dreyfus. April 1, 1932. 400,944.

SYNTHETIC RESINS, compositions of matter containing.—British Celanese, Ltd., and W. H. Moss. April 27, 1932. 400,937.

COAGULATION of latex.—F. Homberger. Nov. 7, 1931. 400,969.

SODIUM ALUMINATE SOLUTIONS, method of producing.—E. L. Rinman. May 4, 1932. 400,984.

WASHING, cleansing, emulsifying, dispersing, wetting-out, or like agents, manufacture and use.—Deutsche Hydrierwerke Akt.-Ges. May 18, 1931. 400,986.

ORGANIC ESTERS of cellulose, hydrolysis.—H. Dreyfus. May 6, 1932. 400,996.

DEGREASING.—J. Savage and Imperial Chemical Industries, Ltd. May 6, 1932. 400,997.

RECOVERY of sulphur dioxide from gas mixtures.—D. Tyrer and Imperial Chemical Industries, Ltd. May 6, 1932. 400,998.

REFINING of copper.—Roessler and Hasslacher Chemical Co. May 9, 1931. 401,008.

STABILISATION of oils and fats.—Swift and Co. May 12, 1931. 401,018.

ALUMINIUM SILICOSULPHIDES, production of products containing.—Metallges Akt.-Ges., O. Schober and A. Schnitzspahn. June 15, 1932. 401,038.

SULPHURIC ACID derivatives of fatty esters and thioesters, process for the manufacture.—Henkel et Cie, Ges. Dec. 5, 1931. 401,116.

ESTERS, including thioesters substituted in the acid residue, manufacture.—Henkel et Cie, Ges. Dec. 5, 1931. 401,117.

HIGH-MOLECULAR SULPHUR compounds, manufacture.—Henkel et Cie, Ges. Dec. 15, 1931. 401,118.

ESTERS AND THIOESTERS substituted in the acid residue, manufacture.—Henkel et Cie, Ges. Dec. 16, 1931. 401,120.

NITRATES, process and apparatus for the production.—R. W. James (Atmospheric Nitrogen Corporation). Dec. 5, 1932. 401,121.

FLUID EMULSIONS, manufacture of stable.—International Bitumen Emulsions Corporation. Nov. 1, 1932. 401,131.

DYESTUFFS of the anthraquinone series, manufacture.—I. G. Garbenindustrie. Jan. 6, 1932. 401,132.

EASILY-SOLUTLE ESTER-SALTS of leuco-vat-dyestuffs, manufacture.—Durand and Huguenin Akt.-Ges. Jan. 25, 1932. 401,137.

ALCOHOLIC FERMENTATION of distillery musts, process for producing and accelerating.—G. Denys. Jan. 28, 1932. 401,138.

HIGHER ETHERS, preparation.—Henkel et Cie, Ges. March 26, 1932. 401,142.

VEGETABLE FIBRES, process for bleaching.—H. T. Böhme Akt.-Ges. June 29, 1932. 401,199.

ARTIFICIAL MASSES, manufacture.—I. G. Farbenindustrie. May 23, 1932. 401,200.

CRYSTALLISED ESTERS of the female sexual hormones, process for the manufacture.—Schering-Kahlbaum Akt.-Ges. May 17, 1932. 401,205.

EXPLOSIVES, process for the production.—I. G. Farbenindustrie. Aug. 10, 1932. 401,207.

ALIPHATIC HYDROCARBONS, method of stabilising chlorinated.—Dow Chemical Co. June 22, 1932. 401,210.

WATER SOFTENING SUBSTANCES, production of base-exchanging.—F. Watson (Aktiebolaget Filtrum). July 6, 1933. 401,235.

CONDENSATION PRODUCTS, process for the manufacture of new.—I. G. Farbenindustrie. July 7, 1932. 401,237.

MAGNESIUM base alloys.—Dow Chemical Co. July 21, 1932. 401,244.

### Complete Specifications Open to Public Inspection

AZO DYESTUFFS, process for the production.—I. G. Farbenindustrie. May 6, 1932. 5828/33.

COPPER SULPHATE, process of producing.—A. Nussbaum. May 4, 1932. 10343/33.

MIXED ETHERS of higher alcohols and applications of the same for textile and similar purposes, processes for the manufacture.—Naamlooze Vennootschap Chemische Fabriek Servo and M. D. Rozenbroek. May 2, 1932. 12634/33.

MULTI-COLOUR light filters, manufacture.—I. G. Farbenindustrie. April 7, 1932. 10465/33.

MOULDED ARTICLES from condensation products derived from aromatic amines and aldehydes, manufacture.—Soc. of Chemical Industry in Basle. May 4, 1932. 10936/33.

PURIFICATION of liquid hydrocarbons with liquid sulphur dioxide or mixtures thereof.—Edeleanu, Ges. May 4, 1932. 12807/33.

RESINOUS PRODUCTS, manufacture.—E. I. Du Pont de Nemours and Co. May 3, 1932. 12953-4/33.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 4, 1932. 13025/33.

AZO DYESTUFFS, manufacture.—E. I. Du Pont de Nemours and Co. May 4, 1932. 13054/33.

PICKLING OF METALS and the like processes.—Grasselli Chemical Co. May 4, 1932. 13076/33.

SENSITISATION of photographic emulsions.—I. G. Farbenindustrie. May 6, 1932. 13149/33.

### Applications for Patents

SEPARATION of weak acids from gases.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 30. 30109.

LUBRICATING OILS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 30. 30110.

FIN-GRAINED PRECIPITATES, producing.—I. G. Farbenindustrie. Oct. 26. (Germany, Oct. 29, '32.) 29721.

WATER-SOLUBLE diazo-amino compounds, manufacture.—I. G. Farbenindustrie. Oct. 31. (Germany, Feb. 15.) 30224.

HYDROXYDIPHENYLENE COMPOUNDS, manufacture.—I. G. Farbenindustrie. Nov. 1. (Germany, Nov. 1, '32.) 30389.

VULCANISATION of rubber, etc.—I. G. Farbenindustrie. Nov. 1. (Germany, Nov. 1, '32.) 30390.

COLOURING MATTERS, manufacture.—Imperial Chemical Industries, Ltd., and M. Wyler. Oct. 27. 29889.

STANDARD silver alloys, manufacture.—Johnson, Matthey and Co., Ltd. Oct. 26. 29764.

ORGANIC CONSTITUENTS in making paper by caustic soda process, recovery.—R. H. McKee. Oct. 28. 29966.

HYDROGENATION PRODUCTS of follicle hormones, production.—Schering-Kahlbaum A.-G. Oct. 26. (Germany, Oct. 27, '32.) 29784.

FOLLICLE HORMONE HYDRATES, producing.—Schering-Kahlbaum A.-G. Oct. 26. 29785, 29786.

GERMINAL GLAND hormone derivatives, manufacture.—Schering-Kahlbaum A.-G. Oct. 26. (Germany, Oct. 27, '32.) 29787, 29788, 29789.

HYDROGENATION PRODUCTS of follicle hormones, manufacture.—Schering-Kahlbaum A.-G. Oct. 26. (Germany, Oct. 27, '32.) 29790, 29791, 29792, 29793, 29794.

MIXING or emulsifying liquids, apparatus.—H. E. Wethered. Oct. 30. 30116.

WELDED METAL VESSELS.—Aluminium Plant and Vessel Co., Ltd. Nov. 7, 30955.

APPARATUS for recovering valuable constituents from industrial waste products by distillation.—G. Andrews. Nov. 8. 31047.

ELECTROLYSIS of zinc chloride, etc. E. A. Ashcroft. Nov. 4. 30677.

TREATING metal-bearing products, etc.—E. A. Ashcroft. Nov. 4. 30678.

BLAST FURNACE SLAGS, treatment.—E. A. Ashcroft. Nov. 4. 30679.

PIGMENTS and metal from zinc, etc., manufacture.—E. A. Ashcroft. Nov. 4, 30680.

DYESUFFS, manufacture.—C. S. Bedford. Nov. 8. 31025.

TESTING FLUIDS.—British Drug Houses, Ltd. Nov. 6. 30841.

REFINING ALUMINIUM.—Calloy, Ltd., and G. N. Kirschom. Nov. 8. 31126.

TREATING vegetable oils.—B. Clayton. Nov. 6. (United States, Nov. 23, '32.) 30785.

ELECTROLYTIC refining of aluminium.—Compagnie de Products Chimiques et Electrometallurgiques Alais, Froges, et Camargue. Nov. 3. (France, Nov. 8, '32.) 30580.

AQUEOUS DISPERSION of carbon black.—Dewey and Almy, Ltd. Nov. 7. (United States, Nov. 28, '32.) 30951, 30952.

COLOURED CONCRETE.—Dewey and Almy, Ltd. Nov. 8. (United States, Dec. 12, '32.) 31112, 31113.

AZO DYESTUFFS, manufacture.—E. I. Du Pont de Nemours and Co., I. Gubelmann and A. R. Murphy. Nov. 3. 30571.

# Prices of Chemical Products

## Weekly Market Conditions

BRITISH chemical manufacturers report a slight improvement in export trade this month, with a steady tone in the home market. An improved inquiry for lithopone and sodium sulphide has been maintained, and there has been a good demand for potassium chlorate, sodium acetate, acetone, formaldehyde, and anhydrous ammonia. A distinct improvement has occurred in forward business in coal tar products, and the prices of xylol, both pure and commercial, have shown a sharp rise. Pure toluol is also dearer. Several export inquiries have been received for cresylic acid, while coal tar pitch remains an unsatisfactory feature. Quiet conditions have prevailed in the essential oil market, with quotations steady, and in the pharmaceutical section there has been a fair amount of business in most items. The prices of all products remain the same as those quoted in THE CHEMICAL AGE of November 11 (pp. 447-448) with the exceptions noted below.

LONDON.—The London chemical market shows little change on the week, prices being firm and inquiries in most directions being of a satisfactory nature. The market for coal tar products remains firm, and prices are unchanged from last week.

MANCHESTER.—The tone of the chemical market here this week has been fairly cheerful and the slight improvement in the aggregate weight of business recently put through has been about maintained. Specifications against commitments already entered into are reported to be circulating on a fairly satisfactory scale, and interest in fresh contracts is sustained. On the latter point, it is stated that so far only a small proportion of the inquiries have developed into actual bookings though the number of orders continues to grow, the firmness of most sections of the market being a factor. Textile chemicals are being called for in fair quantities by the bleaching and dyeing trades, and in a number of other directions business is maintained on its recent level. Moderate export orders are being booked locally. In the by-products market, pitch remains relatively featureless so far as new commitments are concerned, but for the light products the demand is fully maintained and prices are moving towards higher levels.

SCOTLAND.—The latest report from Scotland states that there has been no change in prices. Business is of a quiet nature with some inquiries for prices for contracts for the coming year.

### General Chemicals

ACID, CITRIC.—LONDON: 9½d. per lb., less 5%. MANCHESTER: 9¾d.

ARSENIC.—LONDON: £17 c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 10s. at mines.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d. per lb.

CARBON BLACK.—3⅛d. to 5d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £41.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8⅝d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SULPHATE OF COPPER.—MANCHESTER: £15 10s. per ton, f.o.b.

SULPHUR.—£11 per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

### Pharmaceutical and Fine Chemicals

BISMUTH SALTS.—Carbonate, 7s. 8d. per lb.; citrate, 10s. 3d.; nitrate (cryst.), 5s. 4d.; oxide, 12s.; salicylate, 8s. 7d.; subchloride, 11s. 8d.; subgallate, 8s. 2d.; subnitrate, 6s. 9d.

### Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude 60's, 2s. 5d. to 2s. 6d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 6½d. per gal. SCOTLAND: 60's, 2s. to 2s. 7d.

NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 6½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

PYRIDINE.—90/140, 5s. to 5s. 6d. per gal.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 1s. 9d. to 2s. naked.

TOLUOL.—90%, 2s. 6d. to 2s. 7d. per gal.; pure, 3s. 3d.

XYLOL.—Commercial, 2s. 9d. to 2s. 10d. per gal.; pure, 3s.

# Books Received

**Manufacture of Soda.** By Te-Pang Hou. New York: The Chemical Catalog Co., Inc. Pp. 366. $8.00.

**An Investigation of the Accuracy of Routine Analytical Determinations on Coal and Coke.** Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 40. 9d.

**Economic Conditions in Iraq.** Dated August, 1933. Report by C. Empson. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 50. 1s. 6d.

# New Companies Registered

**Greenwood and Chesters, Ltd.,** 10a Plymouth Grove West, Manchester, 13. Registered October 27. Nominal capital £500 in £1 shares. Colour and chemical manufacturers, dyers, bleachers, manufacturers' merchants, agents, brokers and factors, etc. Directors: F. Greenwood, and G. Newton.

**H. S. Kent & Co., Ltd.** Registered November 8. Nominal capital £1,000 in £1 shares. Soap manufacturers, manufacturers and refiners of and dealers in all kinds of oils, oleaginous and saponaceous substances, chemists, druggists, etc. A subscriber: Reginald Smith and Wm. Webb, 12 Great Newport Street, W.C.

**Ilfra Corporation, Ltd.,** Thanet House, 231 Strand, W.C.2. Registered November 8. Nominal capital £13,000. Manufacturers of hard rubber dust and powders, producers and manufacturers of and dealers in minerals, vegetable gums, chemicals, etc. Directors: Florence E. Peake and Olive L. Swaebe.

# Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

**South Africa.**—H.M. Senior Trade Commissioner in South Africa reports that the City of Cape Town is calling for tenders, to be presented in South Africa by February 8, 1934, for the supply and delivery of complete filtration plants for swimming baths. (Ref. G.Y. 13141.)

**South Africa.**—H.M. Trade Commissioner at Johannesburg reports that the Johannesburg City Council is calling for tenders, to be presented in South Africa by November 29, 1933, for the supply and delivery of one portable air compressor plant with petrol or paraffin engine cable of compressing between 140 and 180 cubic feet of free air per minute. (Ref. G.Y.13136.)

**Austria.**—A firm of merchants established at Vienna wish to obtain the representation, on a commission basis, of United Kingdom manufacturers of drugs, chemicals, colours and liquid spices. (Ref. No. 538.)

**Sweden.**—A firm of agents established at Stockholm wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers or exporters of earth colours, xylol and toluol. (Ref. No. 549.)

**China.**—The Commercial Counsellor at Shanghai reports that a local concern wishes to be placed in touch with United Kingdom manufacturers of plant for the production of reconstructed milk and cream. (Ref. G.Y. 13139.)

**United States.**—An individual in New York desires to import on his own account, and also on a commission basis, gums from sources within the British Empire. (Ref. No. 555.)

**Argentina.**—The Commercial Secretary to H.M. Embassy at Buenos Aires reports that the Argentine State Oilfields Department is calling for tenders, to be presented in Buenos Aires by December 4, 1933, for the supply of a rotary air compressor with a capacity for compressing 2,000 cubic metres of free air per hour. (Ref. G.Y. 13146.)

# Company News

**Lancegaye Safety Glass Co.**—For the period of eighteen months to June 30, the report states that there was a net loss of £1,636, against a loss of £5,000 in the preceding year.

**Sudan Salt Co.**—The accounts for the year ended March 31, 1933, show a loss before depreciation of £4,767. The annual meeting will be held at Winchester House, Old Broad Street, London, on November 22, at 12 noon.

**Foldal Copper and Sulphur Co.**—The accounts for the year 1932 show a loss of £10,063, against a loss of £12,579 in 1931, making a total debit of £175,050. The working profit amounted to £1,144, against a loss of £879.

**Weardale Lead Co.**—The accounts for the year ended September 30, 1933, show a profit of £188, against a debit of £2,651 in the previous year, and after adding income from investments there remains a credit of £881 which the directors propose to carry forward. The annual meeting will be held at Newcastle on November 21, at 12 noon.

**Taylors' Drug Co.**—The report for the year to September 30, 1933, shows a trading profit of £59,993, against £52,201 in 1931-32. Depreciation is charged at £13,311, compared with £8,194, while tax provision is higher at £11,457. The directors recommend a final ordinary payment of 2½ per cent., making 6½ per cent., tax free, against the previous distribution of 6½ per cent. The amount carried forward is £24,401.

# From Week to Week

MR. B. W. YOUNG has resigned his directorship of Bowater's Paper Mills, Ltd.

MR. W. F. LLOYD has resigned his position as managing director of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd.

THE LOCAL AUTHORITIES in the Falkirk area are to make representations to Imperial Chemical Industries, Ltd., against the closing of the Westquarter Works and the transfer of the business to Ardeer.

SIR ALEXANDER GLEGG, of Florys, Prince's Road, Wimbledon Park, S.W.19, chairman of Barry and Staines Linoleum, Ltd., Bowen and Co., Ltd., Masson, Scott and Co., Ltd., and the Linoleum Manufacturing Co., Ltd., who died on September 10 last, left £51,210. Sir Alexander was also on the board of many other companies, including John I. Thornycroft and Co., Ltd.

FOLLOWING THE CLOSING of the St. Lawrence and partly owing to the depreciation of the dollar and import tax, the Manor Power Coal Co., Ltd., Stirling, who depend largely on Canada and America to buy their anthracite, are suspending 300 men this week-end.

THE INSTITUTION OF CHEMICAL ENGINEERS announces that application forms and particulars of the associate-membership examination for 1934, together with a memorandum on "The Training of a Chemical Engineer," may be obtained from the hon. registrar, Abbey House, Westminster, S.W.1. The application forms are returnable on December 20.

THE ANNUAL CHEMICAL DINNER is to be held this year at the Hotel Great Central, Marylebone, on November 28. Lord Leverhulme will occupy the chair and the chief guest will be Sir Ernest Benn. Dancing fallows the dinner. Tickets, 12s. 6d., including gratuities and the dance, may be obtained on application to F. A. Greene, the Chemical Club, 2 Whitehall Court, S.W.1.

A WRIT FOR LIBEL has been served on the "Sunday Referee" by an English firm of solicitors acting on behalf of the Berlin chemical firm of Schering-Kahlbaum A.G. The German firm is claiming damages for alleged libel contained in an article written by Mr. A. J. Gillian, general secretary of the Chemical Workers' Union. Mr. Gillian is joined as co-defendant with the "Sunday Referee" in the action. Because of the international issues raised by the action it is possible that many important personages will be subpœnaed as witnesses.

THE ANNUAL AUTUMN RESEARCH MEETING of the Institution of Gas Engineers was held in London on November 7 and 8. There was a large attendance of delegates at the luncheon given at the Savoy Hotel. Mr. Frank P. Tarratt, the president of the Institution, who presided, stressed the importance of research work in the gas industry. As one of the chief industries in the country they were in this connection pulling their full weight. They had still to bring to light many mysteries which remained to be solved, and which would ultimately be solved.

PLANS FOR THE SCIENTIFIC ORGANISATION of the 1Xth International Congress of Pure and Applied Chemistry, at Madrid, April 5 to 11, 1934, were discussed at a gathering of chemists of Spain and other countries held at the summer University of Santander. Those present and the countries they represented were: E. Biilmann (Denmark); G. Barger (England); F. Haber and R. Willstätter (Germany); C. Matignon and J. Gérard (France); N. Parravano (Italy); Fr. Fichter (Switzerland); E. Cohen (Holland); H. von Euler (Sweden); P. de B. Carneiro (Brazil); and A. Seidell (U.S.A.). The Spanish organising committee and their collaborators included: H. Hauser, president; E. Moles, secretary; and J. A. de Artigas, E. Barrón, A. del Campo, O. Fernandez, J. Giral, A. Madinaveita, F. Calvet, I. Ribas, C. del Fresno, and A. Perez Vitoria.

THE MAIN LINES OF THE PLAN to reform the nitrate industry, as it has been approved by the Chilean Chamber, are now reported. The monopoly of the sale of nitrates belongs to the State, which may cede it, or hire it out for a maximum of 35 years to a selling organisation. (This monopoly may have political consequences, since the State assumes the legal and moral responsibility for the sale of nitrate.) For annual sales of up to 1,000,000 metric tons, 10 per cent. of the total quantity will be taken from already existing stocks, and 90 per cent. will come from fresh production. If sales exceed 1,000,000 metric tons, 25 per cent. will come from stock, and 75 per cent. from fresh production. Profits from the sale of already existing stocks are to be paid to the original creditors of the nitrate industry before the formation of Cosach, who are known under the name of "the beneficiaries of the Ramirez plan. The participation of the State in the profits will be on a sliding scale between 25 per cent. and 45 per cent., according as sales range between 800,000 and 1,500,000 metric tons annually.

MR. A. L. BODDINGTON has been co-opted to a seat on the board of the Cheshire United Salt Co., Ltd., in place of Mr. F. S. Hooker, resigned.

THE PROPRIETORS OF THE LEAD MINES at Wanlochead, which have been closed since 1927, are contemplating opening up in the near future.

MR. EDMUND PEEL POTTER, of Bowfell, Windermere, founder of E. P. Potter and Co., Ltd., chemical manufacturers, of Bolton, left estate of the gross value of £176,874, with net personalty £170,347.

THE RECONSTRUCTION of the Svenska Cellulosa Aktiebolaget, which is one of the assets of Kreuger and Toll, has now been concluded. The general meeting decided to reduce the share capital from Kr.100,000,000 to Kr.30,000,000. After charging off all losses, the remaining book profit was transferred to the reserve fund, which now amounts to Kr.6,000,000.

THE PRINCE OF WALES, Prince George, Sir John Simon, and Sir John Gilmour were among the guests at the centenary dinner of the Factory Department of the Home Office held at the Connaught Rooms in London on November 10. Mr. D. R. Wilson, Chief Inspector of Factories, presided.

NOTICE WAS GIVEN in the "London Gazette" of November 14, in compliance with section 226 of the Companies Act, 1929, of the voluntary winding up of Varcoes China Clays, Ltd., and the appointment of Mr. D. H. Allan, of 4 Fenchurch Avenue, London, as liquidator. All debts have been or will be paid in full.

BRIG.-GENERAL SIR HENRY PAGE CROFT, M.P., is to be the principal guest and chief speaker at the annual dinner of the National Union of Manufacturers in London on November 28. The dinner will be attended by manufacturers from all parts of Great Britain. Brig.-General Sir William Alexander, M.P., president of the Union, will be in the chair.

AN EXTRAORDINARY GENERAL MEETING of the Mersey Power Co., Ltd., a subsidiary of Salt Union, Ltd., held at Liverpool on November 14, approved a resolution authorising the creation and issue of £496,475 3½ per cent. first mortgage debenture stock. The primary purpose of the issue is to repay the loan to the company of £185,000 made by the Westminster Bank, Ltd., under the Trade Facilities Act and guaranteed by the Government and Salt Union, Ltd.

MR. LEONARD EDWIN BOXALL, the principal of the well-known gum arabic firm of Boxall and Co., of Khartoum, Sudan, died suddenly on October 23, aged 43 years. His death came as a great shock to his Somersetshire neighbours and to a wide circle of business friends and acquaintances. Mr. Boxall had recently returned from a business trip to the United States, and was shortly due to go to Khartoum.

MR. PAUL A. M. DIRAC, Lucasian Professor of Mathematics at Cambridge University, has been awarded half the Nobel Prize for Physics for 1933. The prize has been divided between Professor Dirac and Professor Erwin Schroedinger, of Austria, who is at present working at Oxford "in connection with the atomic theory." The physics prize for 1932, which had been held over, has been awarded to Professor Werner Heisenberg, of Leipzig, for his theory of the mechanics of quantities, the application of which led to the discovery of the allotropic forms of hydrogen. The Nobel Prize for Chemistry for 1933 has been reserved for possible distribution next year.

METALLICS AND NON-METALLICS, LTD., is now undertaking the development of a natural sodium sulphate deposit some forty miles north of Maple Creek, Saskatchewan, Canada, estimated to contain more than 25,000,000 tons of Glauber's salt—the largest deposit of its kind in the British Empire. The sulphate as it occurs in the lake is in crystal form, and contains 59 per cent. water of crystallisation, which must be driven off in connection with the conversion of the sulphate into salt cake. Plant construction will entail the expenditure of $150,000. According to the "Financial Post" (Toronto), production of sodium sulphate has been growing from year to year in Saskatchewan, the output last season having exceeded 10,000 tons.

## New Chemical Trade Marks

**Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, 51-52 Chancery Lane, London, W.C.2.**

Opposition to the registration of the following trade mark can be lodged up to December 8, 1933.

**Fugitol.** 544,855. Class 4. Dyes (not mineral and not for toilet purposes). J. C. Thompson and Co., Duron Works, Drummond Road, Bradford, Yorkshire. September 28, 1933.

# Forthcoming Events

**Nov. 20.**—Institute of Chemistry (Leeds Area Section). Annual general meeting. "Electrometric Methods in Physical and Analytical Chemistry." Dr. S. Glasstone. 8 p.m. University, Leeds.

**Nov. 20.**—Institution of the Rubber Industry (Manchester Section). "Naphtha-laden Atmospheres and a Rapid Method for their Analytical Examination." D. F. Twiss and F. A. Jones. The Reynolds Hall, College of Technology, Manchester.

**Nov. 21.**—Institute of Chemistry (Huddersfield Section) and Society of Chemical Industry (Yorkshire Section). "Drikold." Major F. A. Freeth. 7.30 p.m. Technical College, Queen Street, Huddersfield.

**Nov. 22.**—Society of Glass Technology. Billingham, Stockton-on-Tees.

**Nov. 22.**—Royal Society of Arts. "The Radiographic Use of Radium." V. E. Pullin. 8 p.m. John Street, Adelphi, London.

**Nov. 22, 23 and 24.**—The Ceramic Society. Refractory Materials Section. Annual meeting of the section. London.

**Nov. 22.**—Institution of the Rubber Industry (Scottish Section.) "Progress in the Use of Latex in Rubber Manufacture as revealed by Patent Literature." R. F. McKay. 7 p.m. Institution of Engineers and Shipbuilders, 39 Elmbank Crescent, Glasgow.

**Nov. 22.**—Institution of Chemical Engineers. President's Reception. Waldorf Hotel, London.

**Nov. 23 and 24.**—Society of Chemical Industry (Food Group). Symposium on "Bread and Milk." Hall of the Britsh Medical Association, Tavistock Place, London.

**Nov. 23.**—British Science Guild. Norman Lockyer Lecture. "Empire Communication." Professor E. V. Appleton. 4.30 p.m. Hall of the Goldsmiths' Company, Foster Lane, London.

**Nov. 23.**—Society of Dyers and Colourists (West Riding Section). "Recent Developments in Photography, specially relating to Infra-Red." S. O. Rawlings.

**Nov. 23.**—Society of Chemical Industry (Nottingham Section). Joint meeting with the Institute of Fuel. "The Manufacture and Sale of Open-grate Coke." Dr. G. E. Foxwell and John Roberts. 7.30 p.m. University College, Nottingham.

**Nov. 24.**—Society of Chemical Industry and Institute of Chemistry (Edinburgh and East of Scotland Sections). "Plastics and their Application to Friction Fabrics." W. Bain. 8 p.m. Pharmaceutical Hall, 36 York Place, Edinburgh.

**Nov. 24.**—Institute of Chemistry (Belfast and District Section). Annual Dinner. Grand Central Hotel, Belfast.

**Nov. 24.**—The Chemical Society. Discussion on "The Chemical Applications of Optical and Morphological Crystallography." 4.30 p.m. University College of South Wales and Monmouthshire, Cardiff.

**Nov. 24.**—Society of Dyers and Colourists (Scottish Section). "Indian Cotton and Textiles." R. L. H. Carlile. 7.15 p.m. George Hotel, Buchanan Street, Glasgow.

**Nov. 24.**—Institute of Chemistry (Glasgow Section). Refresher Lecture on Organic Chemistry. S. H. Tucker. 7.30 p.m. Royal Technical College, Glasgow.

**Nov. 24.**—The Institute of the Plastics Industry (Midlands Section). "Mould Design." F. H. Mills. 7.30 p.m. Imperial Hotel, Birmingham.

**Nov. 24.**—Manchester Literary and Philosophical Society Chemical Section). "Dope." Dr. J. Robinson. 36 George Street, Manchester.

**Nov. 25.**—British Association of Chemists. Annual general meeting and Dinner. Queens Hotel, Manchester.


SULPHURIC
ALL STRENGTHS
Hydrochloric, Nitric, Dipping, Hydrofluoric, Lactic, Perchloric
F. W. BERK & CO., LTD.
Acid and Chemical Manufacturers since 1870.
106 FENCHURCH ST., LONDON, E.C.3
Telephone: Monument 3874. Wires: Berk, Phone, London.
Works: Stratford, E., and Morriston, Glam.
TAS/Ch.145

OLEUM (all strengths)
Sulphuric, Battery, Dipping, Muriatic, Nitric, and Mixed Acids.
SPENCER CHAPMAN & MESSEL Ltd.
With which is amalgamated WILLIAM PEARCE & SONS, Ltd.
WALSINGHAM HOUSE, SEETHING LANE, E.C.3.
Telephone: Royal 1166. Works: SILVERTOWN, E.16
Telegrams "Hydrochloric Fen, London."

CREPED OR WAXED LINERS
CORRUGATEDS, etc.
For any climatic conditions from Iceland to Bombay
PAPER CONTAINERS AND PACKINGS OF EVERY DESCRIPTION FOR BULK DELIVERY OF CHEMICALS
*Manufacturers and Agents:*
W. K. THOMAS & CO.
CLOCK HOUSE, ARUNDEL STREET, LONDON, W.C.2.
*Tel. 1 Temple Bar 3731. 'Grams: "Plysack Estrand, London,"*

DRYING APPARATUS AND DRYING PLANT
FOR ALL PURPOSES
Complete Chemical Plants
PROCESS — ERECTION — OPERATION
Works: CARLISLE
L. A. MITCHELL LTD. Phone: BLA. 7106-7
CHEMICAL ENGINEERS
37 Peter Street, Manchester

GLYCERINE
We supply all grades for pharmaceutical and industrial purposes. May we have your inquiries?
GLYCERINE, LTD.
Unilever House, Blackfriars, London, E.C.4
Phone Central 7474 GET-2-2 4
Telegrams: Glymol, Lud, London

Manufacturers of
SULPHATE OF ALUMINA
FOR PAPERMAKERS
14/15% IRON FREE. 17/18% IRON FREE finely Ground
14/15% ORDINARY, In Slabs or Crushed.
SODA ALUM for the MANUFACTURE of SATIN WHITE
VIADUCT ALUM CO. LTD.
THE MARSHES, WIDNES.
Tel.—Widnes 339. Tel. Add—"Viaduct, Alum, Widnes."
Codes—Bentley's & A.B.C. (5th Edition).